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ABSTRACT

A benefit-cost analysis of the Job Corps program compared groups randomly assigned to either enroll in the program or to constitute a control group that did not enroll. Youth who participated in the study were those found eligible for Job Corps nationwide between November 1994 and February 1996. Interviews with participants and the assignment of dollar values to costs and benefits were among the research methods used. Benefits and costs measured included the following: (1) benefits of increased output resulting from the additional productivity of Job Corps participants; (2) benefits from reduced use of other programs and services; (3) benefits from reduced crime committed by or against participants; and (4) program costs and costs of resources used by Job Corps. Benefits and costs were measured from the perspectives of society as a whole, participants, and the rest of society (non-participants in Job Corps). The study's findings indicate that Job Corps is a good investment. The benefits to society exceed the costs of the program by nearly $17,000 per participant, assuming that the observed earnings impacts do not decline rapidly as participants get older. The researchers say evidence from other studies suggests the impacts will persist without rapid decay. The study concluded that Job Corps is a valuable program whose benefits exceed costs over a wide spectrum of student groups and for several areas of society. (The report includes 28 tables and 11 figures.) (KC)

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June 2001

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EXECUTIVE SUMMARY

Job Corps plays a central role in federal efforts to provide employment assistance to disadvantaged youths. The program's goal is to help disadvantaged youths become more responsible, employable, and productive citizens by providing intensive and comprehensive services, including education, vocational skills training, and counseling. The services are mostly provided in a residential setting. Each year, Job Corps serves more than 60,000 new enrollees at a cost of more than $1 billion.

The National Job Corps Study, funded by the U.S. Department of Labor, was designed to provide information about the effectiveness of Job Corps in attaining its goal. The cornerstone of the National Job Corps Study was the random assignment of all youths found eligible for Job Corps to either a program or a control group. Program group members could enroll in Job Corps. Control group members could not, but they could enroll in all other programs available to them in their communities.

This report presents the findings of a benefit-cost analysis of Job Corps. In a benefit-cost analysis, a dollar value is placed on each program impact. By measuring impacts in dollars, a benefit-cost analysis enables policymakers to compare the diverse benefits of Job Corps with its costs. It provides a way of assessing the relative size of each impact and the cost-effectiveness of the program as a whole.

Our findings suggest that Job Corps is a good investment: the benefits to society exceed the costs of the program by nearly $17,000 per participant (Table 1). The finding that benefits exceed costs holds under a wide range of plausible assumptions and for most groups, including both residential and nonresidential students. It does, however, depend critically on the assumption that the earnings impacts observed during the study do not decline rapidly as participants get older. Observations during the study and evidence from other research suggest that these impacts will indeed persist without rapid decay.

STUDY METHODOLOGY

A diverse set of benefits and costs was included in the analysis. The measured benefits and costs fall into four categories:

1. The benefits of increased output resulting from the additional productivity of Job Corps participants
2. The benefits from reduced use of other programs and services, including other education and training, public assistance, and substance abuse treatment programs
3. The benefits from reduced crime committed by participants as well as the benefits from reduced crime committed *against* participants

TABLE 1

BENEFITS AND COSTS OF JOB CORPS, BY PERSPECTIVE
(1995 Dollars)

	Perspective		
Benefits or Costs	Society	Participants	Rest of Society
Benefits from Increased Output	**$27,531**	**$17,773**	**$9,758**
Year 1			
Increased Earnings and Fringe Benefits	-1,883	-1,883	0
Increased Child Care Costs	-50	-47	-4
Increased Taxes	0	309	-309
Years 2 to 4			
Increased Earnings and Fringe Benefits	2,558	2,558	0
Increased Child Care Costs	-96	-77	-19
Increased Taxes	0	-855	855
After the Observation Period			
Increased Earnings and Fringe Benefits	27,281	27,281	0
Increased Child Care Costs	-503	-398	-106
Increased Taxes	0	-9,115	9,115
Output Produced During Vocational Training in Job Corps	225	0	225
Benefits from Reduced Use of Other Programs and Services	**2,186**	**-780**	**2,966**
Reduced Use of High School	1,189	0	1,189
Reduced Use of Other Education and Training Programs	874	0	874
Reduced Use of Public Assistance and Substance AbuseTreatment Programs	122	-780	902
Benefits From Reduced Crime	**1,240**	**643**	**597**
Reduced Crime by Participants	1,240	0	1,240
Reduced Crime Against Participants	0	643	-643
Program Costs	**-14,128**	**2,361**	**-16,489**
Reported Program Operating Costs (Net of Transfers)	-12,540	0	-12,540
Unreported Program Operating Costs (Net of Transfers)	-551	0	-551
Capital Costs	-1,037	0	-1,037
Student Pay, Food, and Clothing (Transfers)	0	2,361	-2,361
Net Benefits[a]	**$16,829**	**$19,997**	**-$3,168**
Net Benefits per Dollar of Program Expenditures[b]	**2.02**		

SOURCE: Tables III.7, IV.6, V.5, and VI.4

[a] Because of rounding, net benefits may not equal the sum of the rows. Similarly, benefits to society may not precisely equal the sum of the benefits to participants and the benefits to the rest of society.

[b] The ratio of benefits to costs from each perspective depends partly on arbitrary decisions, such as whether year 1 output is subtracted from benefits or added to costs, and hence it is not easily interpretable. To provide a ratio with a useful interpretation, we present the amount society gains from each dollar spent on the program. The ratio's denominator is the amount spent operating the program ($16,489). The numerator is the benefit to society ($27,531 + $2,186 + $1,240) plus the cost of student pay, food, and clothing ($2,361). The cost of student pay, food, and clothing is included in the numerator to offset the fact that it is included in the denominator even though it is not a cost to society.

4. Program costs, including reported program costs, costs not reported on Job Corps' financial reports, and the economic costs of the capital—land, buildings, furniture, and equipment—used by Job Corps

Benefits and costs were measured from three perspectives: (1) society, (2) participants, and (3) the rest of society. Society's perspective is the most relevant for policymakers because it indicates whether the aggregate benefits from the program are greater than the resources used by the program, abstracting from who enjoys the benefits of the program and who bears its costs. Members of society fall into two groups: participants and everyone else (the rest of society). The participants' perspective indicates whether participating in Job Corps is a good investment for the youths themselves. The rest of society's perspective indicates the magnitude of the investment in Job Corps made by taxpayers and other citizens.

Most benefits were estimated by multiplying an estimate of the program's impact by an estimate of the dollar value of the impact. The impacts were estimated using data from surveys conducted soon after random assignment (when youths were first determined eligible to participate in Job Corps), and 12, 30 and 48 months afterwards. Most impacts were converted into benefits using market prices.

We observed our sample members for about three years after they left Job Corps. However, Job Corps aims to make long-term changes in youths' lives that can be expected to continue well beyond our study. We took a long-term, but cautious, approach to account for future benefits. Only benefits that did not decline during the observation period were assumed to continue after it. Impacts on crime and use of other services and programs declined during the follow-up period; hence, we did not measure the future benefits for these impacts. However, impacts on earnings persisted without decline, so we estimated the benefits from these impacts that will occur after the observation period.

We tested the sensitivity of our estimates to alternative assumptions. The benchmark estimates presented in Table 1 are based on the best available data and, in our judgment, the most appropriate assumptions. However, recognizing the uncertainty inherent in these estimates and assumptions, we tested the sensitivity of our estimates to alternative estimates and assumptions. This sensitivity analysis plays a role analogous to the role of standard errors in the estimates of Job Corps impacts.

BENEFITS: INCREASED OUTPUT

A major goal of Job Corps is to increase the employment and earnings of the youth it serves. Our study concludes that the program meets this goal.

The largest benefit of Job Corps is the value of the additional output that participants produce. Job Corps participants produced $27,500 more output per participant than their control group counterparts. This includes increased output produced during employment net of increased child care costs and the value of the output produced by participants during vocational training. The increased output produced during employment was measured by the increase in participants' total compensation—that is, earnings and fringe benefits.

Output initially decreased in the first year, but then increased in the remaining three years of the observation period. In the first year of the observation period, output produced by Job Corps participants was about $1,700 per participant less than that produced by their control group counterparts, reflecting the participants' forgone employment opportunities while in Job Corps (Figure 1). However, in the remaining three years of the observation period combined, output was about $2,500 per participant higher than in the absence of Job Corps.

Output produced after the observation period was estimated to be $26,800 per participant. The dollar value of the annual impact on compensation in the last year of the observation period ($1,550) was assumed to persist for the rest of the average participants' working lifetime. The rationale for this assumption was:

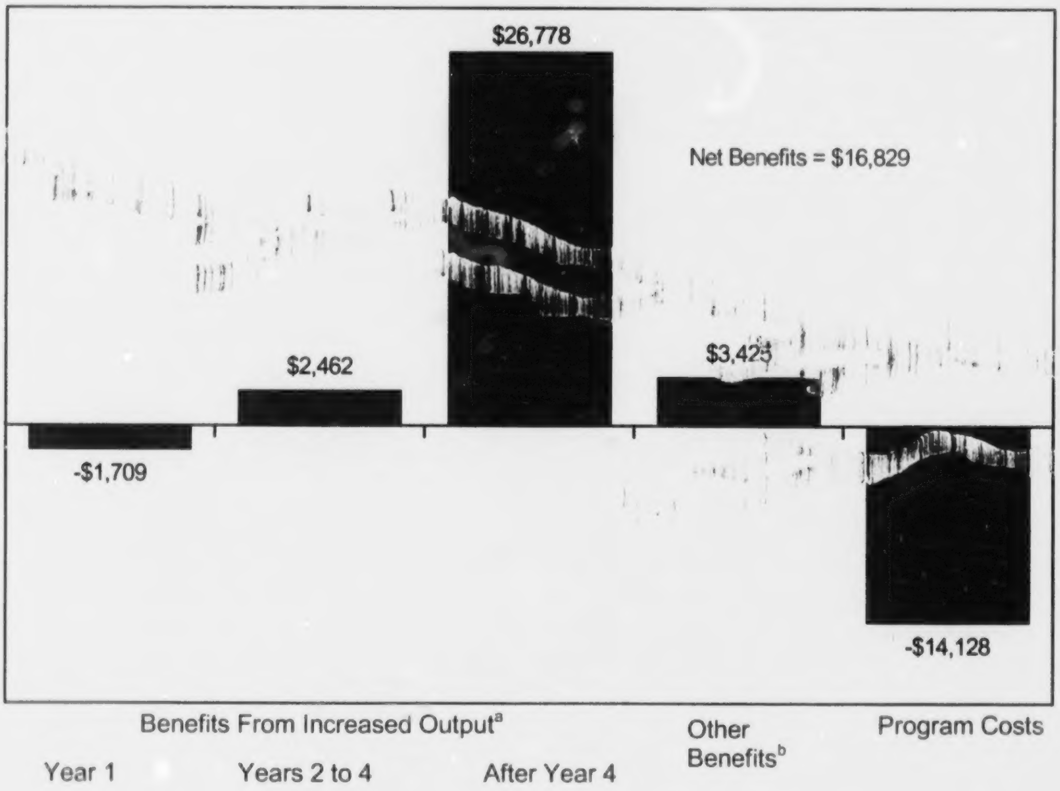
1. ***The impacts of Job Corps did not decline during the observation period.*** We found that impacts increased during the third year in the observation period and persisted without a decline in the fourth year (approximately the second and third year, respectively, after program participation). Long-term studies of the returns to training find that, if returns decline, the decline occurs within two or three years after a trainee leaves the program.
2. ***Job Corps teaches multiple skills.*** Participants in Job Corps engage not just in vocational training but also in academic education and training in social and workplace skills. Studies of other programs suggest that the impacts from programs that teach broader skills are more likely to persist.
3. ***Job Corps improved literacy and numeracy skills.*** We found Job Corps raised scores on tests of literacy and numeracy skills used in the workplace. These basic skills are less likely to become obsolete over time than more narrow job-specific training.
4. ***The earnings impacts from participation in Job Corps in the fourth year of the observation period were similar to the returns to a year of school.*** On average, the return to an additional year of school persists without decline for the rest of a workers' lifetime.

Our approach assumes that the dollar value of the earnings impact persists over time. Because average earnings increase with workers' age, our assumption implies a *decline* in the impact as a percentage of earnings. If instead of assuming a constant-dollar-earnings impact ($1,550) we assumed a constant-proportionate-earnings impact (12 percent), the estimate of the net benefits of Job Corps would increase substantially.

Job Corps increases child care costs. The additional time Job Corps participants spend in training and employment means they spend less time caring for children in the home and have a greater need for child care outside the home. The cost of this additional child care to society is about $600 per participant.

FIGURE 1

BENEFITS AND COSTS TO SOCIETY
(1995 Dollars per Participant)



[a] Includes earnings and fringe benefits minus child care costs. Year 1 also includes output produced during vocational training.

[b] Includes reduced use of other programs and services and reduced crime.

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As Job Corps participants earn more, they pay more in taxes. We estimated that Job Corps participants will pay about $9,700 more in federal, state, and local taxes throughout their working lives. The increased taxes impose a cost on participants and a benefit to the rest of society. From society's perspective, these benefits and costs offset each other.

Job Corps students also produce goods and services during vocational training. The goods and services produced by students for community organizations benefit society by about $200 per participant.

BENEFITS: REDUCED USE OF PROGRAMS AND SERVICES OTHER THAN JOB CORPS

Job Corps reduces the use of a wide variety of other programs and services.

The benefit to society from the reduced use of other programs and services was about $2,200 per participant. More than half of this benefit was from the reduced attendance at high school, which saved society just under $1,200 per participant. Most of the rest is from their reduced use of other education and training programs, although a small amount was due to the reduced use of public assistance and substance abuse treatment programs.

Job Corps participants received almost $800 less in public assistance. This forgone assistance is a cost to participants but because it is offset by a benefit to the rest of society, which does not need to pay the public assistance costs, it is neither a cost nor a benefit to society. However, the forgone cost of administering the assistance, estimated to be about $100 per participant, is a benefit to society.

BENEFITS: REDUCED CRIME

Job Corps reduces both the crime committed by participants and the crime committed against them. The benefits from reduced crime include both reduced use of resources by the criminal justice system (for apprehension, prosecution, and sanctions) and the reduced costs to victims of crime (mainly for injury and property loss).

The benefits to society from reduced crime were about $1,200 per participant. A reduction in murder committed by Job Corps participants accounted for nearly half of these benefits and a reduction in burglary accounted for another one-third. About three-quarters of the total benefits was a result of reduced costs to victims; the remaining one-quarter was a result of reduced costs in the criminal justice system.

Participants also benefit from the reduction in crime committed against them, estimated to be about $700 per participant. This reduction is likely to be offset by an increase in crime against other people, as criminals pick other targets. Therefore, we assumed the reduction in crime committed against participants does not affect the total amount of crime in society.

PROGRAM COSTS

Job Corps provides many intensive services to its participants for a sustained period and, as a result, uses considerable resources.

Job Corps uses resources valued at just over $14,100 per participant. The majority of these costs ($12,500) are program operating costs reported on Job Corps' financial reports. The rest of the costs include: the estimated costs of Job Corps' capital ($1,000) and the donations, grants, volunteers, costs of staff at the national and regional offices, and other costs not reported on Job Corps' financial reports ($600).

Government expenditures on Job Corps were about $16,500, about $2,400 more than program costs to society. Some of the government expenditures for Job Corps are used to pay allowances and bonuses to Job Corps students and provide them with food and clothing. As these payments, food, and clothing have intrinsic value to participants regardless of their value as an investment in the future, these expenditures are offset by equal immediate benefits to Job Corps participants. Hence these expenditures are not costs to society but are transfers from the rest of society to Job Corps participants.

It costs society about $3,000 (25 percent) more for a residential student than a nonresidential student. The higher costs are mainly related to the higher costs of counseling, residential advisors and other instruction, food, and health services. The relatively small residential-nonresidential cost difference is not surprising given that nearly all Job Corps services are offered to both residential and nonresidential students.

COMPARING BENEFITS AND COSTS

By comparing benefits and costs we can address the central question of this study: Do the benefits from Job Corps exceed its costs?

Job Corps is a good investment of society's resources: benefits exceed costs. On average, we estimate that society will benefit from an increase in resources equivalent to about $17,000 for every youth it sends to Job Corps. Job Corps returns to society about $2 for every dollar spent on the program.

Job Corps is a good deal for participants. They gain $20,000 each, on average, mostly from increased earnings and fringe benefits net of increased taxes and child care costs after leaving Job Corps. The value of the pay, food, and clothing Job Corps participants receive while enrolled in Job Corps generally offset the earnings and fringe benefits forgone while attending Job Corps

The rest of society pays for Job Corps, but shares in the benefits. While the government spends about $16,500 on each participant, most of these costs are offset by the increased taxes paid by participants, reduced use of education, training, and public assistance programs, and the reduced costs of crime. After realizing these benefits, the net cost to the rest of society is only $3,200 per participant.

Benefits exceed costs for most groups of youth. Net benefits to society are positive for residential and nonresidential students, students attending centers run by private contractors and centers run by government agencies, and those attending small-, medium-, and large-sized centers. Benefits also exceed costs for most groups defined in terms of participants' characteristics at baseline. We do not expect benefits to exceed costs for Hispanics and youth aged 18 and 19 at random assignment because Job Corps had no impacts on the earnings of these youth toward the end of our observation period.

Benefits exceed costs under a wide range of plausible assumptions. The most critical assumptions are those that affect the estimate of the increased output after the observation period. If the earnings impact declines rapidly after the observation period, which in our judgment is unlikely, benefits from Job Corps would not exceed its costs. Our conclusion that benefits exceed costs requires that either the dollar value of the earnings impact in the last year of the observation period declines at less than 8 percent each year until retirement, or the dollar value of the impact persists for at least nine years without any decline. In the coming years, it may be possible to replace these predictions about future benefits with empirical estimates of the long-term impacts of Job Corps, based on data from administrative records on sample members' earnings. The estimate of net benefits varied by less than $4,000 when we changed assumptions unrelated to benefits after the observation period.

I. INTRODUCTION

Job Corps plays a central role in federal efforts to provide employment assistance to disadvantaged youths. The program's goal is to help disadvantaged youths become more responsible, employable, and productive citizens by providing intensive and comprehensive services, including education, vocational skills training, and counseling. The services are provided in a residential setting to most, but not all, participants. Each year, Job Corps serves more than 60,000 new enrollees at a cost of more than $1 billion.

The National Job Corps Study, funded by the U.S. Department of Labor (DOL), was designed to provide information about the effectiveness of Job Corps in attaining its goal.[1] The study consists of three components: (1) an impact analysis, (2) a process analysis, and (3) a benefit-cost analysis. This report presents the findings of the benefit-cost analysis of Job Corps: a comparison of the benefits of the program with its costs.

The cornerstone of the National Job Corps Study was the random assignment of all youths found eligible for Job Corps, nationwide, between November 1994 and February 1996, to either a program or a control group. Program group members were permitted to enroll in Job Corps and control group members were not permitted to enroll for three years (although they could enroll in other education and training programs). We conducted interviews with members of both program and control groups at baseline (shortly after random assignment), and then 12, 30, and 48 months after random assignment. We then used the data from these interviews to estimate the impacts of Job Corps on the youths' lives.

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[1] The study was conducted by Mathematica Policy Research, Inc. (MPR) and its subcontractors, Battelle Memorial Institute and Decision Information Resources, Inc.

The impact analysis showed that Job Corps does significantly change young people's lives (Schochet et al. 2001). Youths who have participated in Job Corps have higher earnings, on average, than they would have if they had not enrolled in the program. Also, youths who have participated in Job Corps are less likely to engage in criminal activities or receive public assistance. However, Job Corps represents a large investment—it costs the government an average of about $16,500 for each student who participates. This report shows that under a wide range of assumptions, the impacts of Job Corps on the lives of its participants are commensurate with this investment in the program.

The rest of this chapter is organized as follows. Section A summarizes the operational structure of Job Corps, its key program elements, and the characteristics of youths who are found eligible for it. Section B describes the principal elements of the National Job Corps Study, including the research questions, the design of the impact analysis, and the most important findings from the impact and process analyses. Section C ends the chapter with a description of the organization of the rest of the report.

A. OVERVIEW OF JOB CORPS

The Job Corps program, established by the Economic Opportunity Act of 1964, operates under provisions of the Workforce Investment Act (WIA) of 1998.[2] The operational structure of Job Corps is complex, with multiple levels of administrative accountability, several distinct program components, and numerous contractors and subcontractors. DOL administers Job Corps through a national office and nine regional offices. The national office establishes policy and requirements, develops curricula, and oversees major program initiatives. The regional offices procure and administer contracts and perform oversight activities, such as reviews of center performance. Through its regional offices, DOL uses a competitive bidding process to contract out center operations, recruiting and screening of new students, and placement of students into jobs and other educational opportunities after they leave the program. At the time of the study, 80 centers were operated under such contracts.[3] In addition, the U.S. Departments of Agriculture and of the Interior operated 30 centers, called Civilian Conservation Centers (CCCs), under interagency agreements with DOL.

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[2] For much of the study, Job Corps operated under provisions of the Job Training Partnership Act (JTPA) of 1982.

1. Outreach and Admissions

Outreach and admissions (OA) agencies conduct recruitment and screening for Job Corps. OA agencies include private nonprofit firms, private for-profit firms, state employment agencies, and the centers themselves. These agencies provide information to the public through outreach activities (for example, by placing advertisements and making presentations at schools), screen youths to ensure that they meet the eligibility criteria, assign youths to centers (when the regional office delegates this function), and arrange for transportation to centers.

2. Job Corps Center Services

Job Corps is a comprehensive and intensive program. Its major components include basic education, vocational training, residential living (including training in social skills), health care and education, counseling, and job placement assistance. Services in each of these components are tailored to each participant.

Education. The goal of the education component is to enable students to learn as fast as their individual abilities permit. Education programs in Job Corps are individualized and self-paced, and they operate on an open-entry and open-exit basis. The programs include remedial education (emphasizing reading and mathematics), world of work (including consumer education), driver education, home and family living, health education, English for those whose primary language is not English, and a General Educational Development (GED) program of high school equivalency for academically qualified students. About one-fourth of the centers can grant state-recognized high school diplomas.

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[3] At the time of the study, a total of 110 centers were in operation, including the five centers in Alaska, Hawaii, and Puerto Rico. Currently, 119 centers are operating.

Vocational Training. The vocational training programs at Job Corps, like the education component, are individualized and self-paced and operate on an open-entry, open-exit basis. Each Job Corps center offers training in several vocations, typically including business and clerical, health, construction, culinary arts, and building and apartment maintenance. National labor and business organizations provide vocational training at many centers through contracts with the Job Corps national office.

Residential Living. Residential living is the component that distinguishes Job Corps from other publicly funded employment and training programs. The theory is that, because most participants come from disadvantaged environments, they require new, more supportive surroundings to derive the maximum benefits from education and vocational training. Historically, regulations had limited the number of nonresidential students to 10 percent, but Congress raised that limit to 20 percent in 1993. All students, including nonresidential students, must participate in formal social skills training. The residential living component also includes meals, dormitory life, entertainment, sports and recreation, center government, center maintenance, and other related activities that are available to all students.

Health Care and Education. Job Corps centers offer comprehensive health services to both residential and nonresidential students. Services include medical examinations and treatment; biochemical tests for drug use, sexually transmitted diseases, and pregnancy;

immunizations; dental examinations and treatment; counseling for emotional and other mental health problems; and instruction in basic hygiene, preventive medicine, and self-care.

Counseling and Other Ancillary Services. Job Corps centers provide counselors and residential advisers, who help students plan their educational and vocational curricula, offer motivation, and create a supportive environment. These staff also provide support services during recruitment, placement, and the transition to regular life and jobs following participation in Job Corps.

3. Placement

The final step in the Job Corps program is placement, which helps students find jobs in training-related occupations with prospects for long-term employment and advancement. Placement contractors may be state employment offices or private contractors, and sometimes the centers themselves perform placement activities. Placement agencies help students find jobs by providing assistance with interviewing and resume writing and services for job development and referral. They are also responsible for distributing the readjustment allowance, a stipend students receive after leaving Job Corps.

4. Characteristics of Youths Served by Job Corps

To participate in Job Corps, youths must be legal U.S. residents ages 16 to 24. Males 18 or older must be registered with the Selective Service Board, and minors must have the consent of a parent or guardian. Youths must also be disadvantaged (defined as living in a household that receives welfare or has income below the poverty level) and living in a debilitating environment that substantially impairs prospects for participating in other programs. Youths must need additional education, training, and job skills and possess the capacity and aspirations to benefit from Job Corps. They must also be free of serious behavioral and medical problems, and they must have arranged for adequate child care (if necessary) when they participate in Job Corps.

The detailed information from the study's baseline interview provides insights about the backgrounds of eligible Job Corps applicants (Schochet 1998a). Most eligible applicants are male (60 percent), and most are younger than 20 (40 percent are 16 or 17 years old, and nearly one-third are 18 or 19). About 40 percent live in the South, and more than 70 percent are members of racial or ethnic minority groups: 50 percent are African American, 18 percent are Hispanic, 4 percent are Native American, and 2 percent are Asian or Pacific Islander. Most (nearly 80 percent) do not have a high school credential. About 18 percent have children, and nearly 60 percent received some form of public assistance during the year prior to random assignment. About one-quarter reported that they had ever been arrested, and about 30 percent reported using illegal drugs in the year prior to random assignment.

5. Policy Changes Related to Violence and Drugs

In response to congressional concerns about the operation of the program, Job Corps instituted zero-tolerance (ZT) policies for violence and drugs in March 1995—early in the sample intake period. These new policies were intended to ensure full and consistent implementation of existing rules regarding violence and drugs. Under ZT policy, students accused of specific acts of violence (possession of a weapon, assault, sexual assault, robbery, extortion, or arson) or arrested for a felony are removed from the center immediately and, if fact-finding establishes their guilt, terminated from the program. The ZT policy for drugs uses the same procedures for students accused of possession or sale of illegal drugs or alcohol on center or convicted of a drug offense. The policies were intended to facilitate the rapid removal of offending students and to eliminate any discretion of staff regarding termination. Most Job

Corps staff reported that the new policies substantially improved the quality of life on centers (Johnson et al. 1999).

B. OVERVIEW OF THE NATIONAL JOB CORPS STUDY

The National Job Corps Study was designed to be a comprehensive study of the effectiveness of Job Corps.[4]

1. Research Questions

The study addresses six major research questions:

1. How effective is Job Corps overall at improving the employability of disadvantaged youth?
2. Does the effectiveness of Job Corps differ for youth with different personal characteristics or experiences before application to Job Corps?
3. Do program impacts differ for centers with different characteristics?
4. Do program impacts differ for enrollees with different program experiences?
5. What is the Job Corps program "model," and how well is it implemented in practice?
6. How do the benefits from Job Corps compare with its costs?

The impact analysis is at the core of the study and addresses Questions 1 to 4. The results of the impact analysis are presented in Schochet et al. (2001), Burghardt and Schochet (2001), Gritz and Johnson (2001), and Glazerman et al. (2000). The process analysis addresses Question 5 by describing the key elements of the Job Corps program model and documenting how they were implemented during 1996—roughly the period when the study program group members were enrolled in Job Corps centers. The findings of the process analysis are described in Johnson et al. (1999).

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[4] Burghardt et al. (1994) describe in detail the design of the National Job Corps Study.

The benefit-cost analysis, which is contained in this report, addresses Question 6 by drawing on both the impact and the process analyses. The impact analysis provides estimates of the impacts of the program, and from these we estimate its benefits. Understanding the nature of the program was important in analyzing its costs.

2. The Impact Analysis

Because the impact estimates are at the core of the benefit-cost analysis, this section describes the design of the impact analysis in more detail.

a. Sample Design for the Impact Analysis

The central feature of the study design was the random assignment of all youths found eligible for Job Corps, either to a program group whose members were permitted to enroll in Job Corps or to a control group whose members were not. Sample intake occurred between November 1994 and February 1996. With few exceptions, all youths who applied to Job Corps for the first time between November 16, 1994, and December 17, 1995, and were found eligible for the program were included in the study—a total of 80,883 eligible applicants. During the sample intake period, 5,977 Job Corps-eligible applicants were randomly selected to the control group. Approximately 1 eligible applicant in 14 (7 percent of 80,883 eligible applicants) was assigned to the control group.

During the same 16-month period, 9,409 eligible applicants were randomly assigned to the research sample as members of the program research group (hereafter referred to as the program group).[5] Because random assignment occurred after youths were determined eligible for Job Corps (and not after they enrolled in Job Corps centers), the program group includes youths who enrolled in Job Corps (about 73 percent of eligible applicants), as well as those who did not enroll, the so-called "no-shows" (about 27 percent of eligible applicants). Although the study's research interest focuses on enrollees, all youths who were randomly assigned, including those who did not enroll at a center, were included in the analysis to preserve the benefits of the random assignment design.

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[5] The remaining 65,497 eligible applicants were randomly assigned to a program nonresearch group. These youths were allowed to enroll in Job Corps but are not in the research sample.

Control group members were not permitted to enroll in Job Corps for a period of three years, although they were able to enroll in other programs available to them. Thus, the outcomes of the control group represent the outcomes that the program group would have experienced if they had not been given the opportunity to enroll in Job Corps. Because control group members were allowed to enroll in other education and training programs, the comparisons of program and control group outcomes represent the effects of Job Corps relative to other available programs that the study population would enroll in if Job Corps were not an option. The impact estimates do not represent the effect of the program relative to no education or training; instead, they represent the incremental effect of Job Corps.

The National Job Corps Study is based on a fully national sample. With a few exceptions, the members of the program and control groups were sampled from all OA agencies located in the contiguous 48 states and the District of Columbia, rather than from only some OA agencies in certain areas.[6] This design feature allows us to obtain impact estimates more precise than those that could be obtained from a clustered sample of the same size. In addition, the nonclustered design spread random assignment across all OA agencies and Job Corps centers, which prevented undue burden from falling on any one agency or center.

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[6] Youths who previously participated in Job Corps ("readmits") or who applied for one of seven small, special Job Corps programs were excluded from the study (Burghardt et al. 1999).

The sampling rates to the control and program groups differed for some population subgroups, for both programmatic and research reasons. For example, OA agencies experienced difficulties recruiting females for residential slots, and Job Corps staff were concerned that the presence of the control group would cause these slots to go unfilled. Therefore, sampling rates to the control group were set lower for females in areas from which high concentrations of residential students come. Because of differences in sampling rates across population subgroups, all analyses were conducted using sample weights, so that the impact estimates can be generalized to the intended study population: applicants in the 48 contiguous states and the District of Columbia who applied to Job Corps during the 13-month period between November 17, 1994, and December 16, 1995, and who were determined to be eligible.

b. Implementation of Random Assignment

As expected, random assignment produced equivalent groups, because the distributions of the characteristics of program and control group members prior to random assignment were similar (Schochet 1998b). However, our ability to draw valid inferences from a random assignment study depends on three conditions: (1) that all members of the study population were subject to random assignment, (2) that control group members did not enroll in the program, and (3) that operations of the program were not materially affected by the study.

To identify center enrollees in the study population who were not randomly assigned and to ensure that control group members did not enroll, we examined weekly extracts from the Job Corps Student Pay, Allotment, and Management Information System (SPAMIS) on all new center enrollees.

Our monitoring indicates that Job Corps staff implemented random assignment procedures well. Less than 0.6 percent of youths in the study population were not randomly assigned. In addition, only 1.4 percent of control group members enrolled in Job Corps before the end of the three-year period during which they were not supposed to enroll. Hence, we believe that the research sample is representative of the youths in the intended study population and that the bias in the impact estimates due to contamination of the control group is very small.

In general, the study did not appear to alter program operations substantially, which suggests that the study is evaluating Job Corps as it would have operated in the absence of the study. We found from the process analysis that the effects of the random assignment process on OA counselors' activities and on the composition of students entering the program appear to have been modest (Johnson et al. 1999). For example, few OA counselors said they started new outreach activities, spent more time on outreach, or lost referral sources because of the study. In addition, OA counselors do not appear to have provided substantially more assistance in finding alternative training opportunities to the control group than they provided for other applicants who could not enroll in Job Corps.

The study, however, contributed somewhat to the decrease in the number of center slots that were filled (that is, in center on-board strength) in early 1995, because control group members were removed from the pool of potential center enrollees. We estimate, however, that the introduction of the new ZT policies had a much larger effect on the decrease in center on-board strength. Nonetheless, the study could have had some effect on the training experiences of program group members, as centers served fewer students without reducing center staff.

c. Data Sources for the Impact Analysis

Most of the data for the impact analysis were collected in four waves of interviews: at baseline, and at 12, 30, and 48 months after random assignment. Data were also collected from the Job Corps intake forms (ETA-652) and the Supplemental ETA-652 forms created for this study and filled out by the OA counselors as part of the application process. Basic-skills tests were also administered to a subsample of the research sample in conjunction with the 30-month interview (Glazerman et al. 2000).

d. Survey Design and Response Rates

All sample members were contacted by telephone for the baseline interviews soon after they had been subject to random assignment. In randomly selected areas, we attempted in-person interviews with sample members who had not been interviewed by telephone within 45 days of random assignment. We subsampled youths for in-person interviews at baseline to contain data collection costs while ensuring that youths who required intensive follow up, including in-person interviewing, were fully represented in the study's sample.

The target sample for the 12-month follow-up interview included (1) all sample members selected for in-person interviews at baseline (whether interviewed or not), and (2) all those who completed the baseline interview by telephone. We attempted 30- and 48-month interviews with all sample members who had completed either a baseline or a 12-month follow-up interview. All follow-up interviews were attempted first by telephone, then in person if necessary. The response rate for the 48-month follow-up interview was 81 percent.[7]

e. Sample Size

The primary sample used for the impact analysis includes the 11,313 youths (6,828 program group members and 4,485 control group members) who completed the 48-month interview. About 88 percent of this sample also completed a 30-month interview, and 95 percent completed a 12-month interview. Furthermore, baseline interview data are available for everyone in this sample, because all youths completed either the full baseline interview or the abbreviated baseline in conjunction with the 12-month interview. Hence, complete data over the whole four-year observation period are available for most of the analysis sample.

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[7] This is the effective response rate, the response rate for sample members eligible for in-person interviews at baseline.

f. Analytical Methods

We obtained the estimates of the impact of Job Corps per eligible applicant by computing the differences in average outcomes between all program and control group members. This differences-in-means approach yields unbiased estimates of the impacts of Job Corps for program applicants determined to be eligible for the program. We calculated all estimates with sample weights, to account for the sample and survey designs and for the effects of interview nonresponse. Hence, the estimates can be generalized to the intended study population.

In this report, we use estimates of the impacts for program group members who enrolled in Job Corps: *participants*. We obtained these estimates by dividing the program impact estimates per eligible applicant by 0.73 (the proportion of program group members who enrolled). About 1.4 percent of all control group members (and 1.2 percent in the 48-month sample) enrolled in Job Corps before their three-year restriction period ended. We adjusted for these "crossovers" by estimating the effect only on participants who we predicted would not participate if they were assigned to the control group. About 3.2 percent of control group members enrolled in Job Corps after their restriction period ended but before the end of the observation period. We adjusted for these "late crossovers" by "assuming" that they never enrolled in Job Corps, and we imputed their employment and education outcomes for the last five quarters of the observation period. These adjustment procedures, discussed fully in Schochet et al. (2001) and Schochet (2001), had little effect on the estimates.

3. Key Findings from the Impact and Process Studies

The detailed findings from the impact and process analyses are presented in Schochet et al. (2001) and Johnson et al. (1999). Here we summarize the main findings of the impact analysis:

- ***Job Corps provided extensive education, training, and other services to the program group.*** About 73 percent of the program group reported enrolling in Job Corps within 48 months. The average period of participation was about eight months.
- ***Job Corps substantially increased the education and training services that eligible applicants received, and it improved their educational attainment.*** On average, Job Corps increased the amount of academic classroom instruction and vocational training that participants received (both in and out of Job Corps) by about 1,000 hours. It also provided instruction that was more focused on vocational skills training than was the instruction received elsewhere. Job Corps substantially increased the receipt of vocational and GED certificates, but had no effect on college attendance.
- ***Job Corps generated positive employment and earnings impacts by the beginning of the third year after random assignment and the impacts persisted through the end of the observation period.*** During the last year of the observation period, the gain in average weekly earnings per participant was $22, or 12 percent. The earnings gains were due to a combination of greater hours of work and higher earnings per hour.
- ***Job Corps significantly reduced youths' involvement with the criminal justice system.*** Participation in Job Corps reduced the arrest rate by about 5 percentage points (16 percent). The reductions occurred for nearly all categories of crime, although they were slightly larger for less serious crimes. Job Corps also led to reductions in crimes committed against program participants.
- ***Job Corps participation reduced the receipt of public assistance.*** Overall, program group members reported receiving about $460 less in cash welfare and food stamps than control group members and this impact is statistically significant at the 1 percent level.
- ***Job Corps improved functional literacy.*** The literacy tests conducted in conjunction with the 30-month follow-up interviews indicated that Job Corps had positive impacts on all three domains tested—prose, document, and quantitative. These impacts were statistically significant at the 10 percent level for the prose and quantitative scales.
- ***Job Corps participation produced modest or no impacts on other outcomes.*** Job Corps participation improved participants' perceived health status. Job Corps had no impacts on the self-reported use of tobacco, alcohol, and illegal drugs and had no impacts on fertility or custodial responsibility for children.
- ***The residential and nonresidential programs serve different groups of students, and each is effective for the groups it serves.*** Impacts on earnings for residential students

were positive near the end of the observation period for most groups. Earnings impacts for nonresidential students were also positive overall.

- ***Most subgroups of students benefited from Job Corps.*** Positive earnings gains were observed for most groups, including those defined by gender, age, race and ethnicity, arrest experience, and whether the youth applied to the program before or after the new ZT policies took effect. Thus, overall positive impacts were not due to the experiences of a particular group but were widespread throughout the population that the program serves.
- ***The impacts were similar across different types of centers.*** Impacts on earnings and GED attainment were positive and similar in magnitude in contract centers and CCCs, in centers of different sizes, and in centers that score differently on the Job Corps performance measurement system. The analysis indicates that the beneficial impacts of the program are broadly distributed throughout the country and not confined to a few regions.

The main finding from the process analysis was that the Job Corps program model is well designed and well implemented. Job Corps students receive substantial, significant education and training services. The interviews with youths in our sample confirmed this finding.

C. ORGANIZATION OF THE REST OF THE REPORT

The rest of the report is organized as follows. Chapter II provides an overview of the methodology used in this benefit-cost analysis. Chapters III, IV, and V describe the estimates of certain groups of benefits from Job Corps, respectively: the increased output, the reduction in the use of other programs and services by Job Corps participants, and the reduction in criminal activity. Chapter VI presents our estimates of the costs of Job Corps. We compare the benefits and costs of Job Corps in Chapter VII.

II. OVERVIEW OF METHODOLOGY

In a benefit-cost analysis, a dollar value is placed on each impact of the program. By measuring key impacts in dollars, a benefit-cost analysis enables policymakers to compare the diverse benefits of Job Corps with its costs. The analysis provides policymakers with a way of assessing the relative size of each impact and the cost-effectiveness of the program as a whole.

This chapter provides an overview of the methodology used in the benefit-cost analysis of Job Corps. The general methodology draws heavily on the framework developed for the 1982 benefit-cost analysis of Job Corps presented in Thornton et al. (1982) that has subsequently been used to assess a wide range of social programs.[1]

We have organized this chapter as follows. Section A summarizes the benefits and costs included in the analysis. Section B describes the three perspectives from which we compare benefits and costs. Section C presents our measurement approach. Section D describes our approach to measuring benefits that occur after the four-year observation period. Section E explains how we compare upfront costs with benefits that may occur well into the future. Section F concludes the chapter with a discussion of our approach to dealing with the uncertainty associated with our estimates of the benefits and costs.

A. BENEFITS AND COSTS INCLUDED IN THE ANALYSIS

Our goal was to place a dollar value on all measured Job Corps impacts that could feasibly be valued. Hence, we measured a wide range of different benefits and costs (listed in Table II.1.) At the end of this section, we describe some benefits and costs that we did not measure.

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[1] See, for example, Kemper et al. (1984), Gordon (1992), Friedlander and Hamilton (1993), and Riccio et al. (1994).

1. Benefits

Benefits fall into three broad categories: (1) the increased output produced by Job Corps participants, (2) the reduced use of other programs and services, and (3) the reduced criminal activity both by and against Job Corps participants.

a. Increased Output of Job Corps Participants

This is the most important benefit of Job Corps, whose stated goals include improving the productivity of the youths it serves. The impact analysis found that the program succeeded. Job Corps increased both the probability of being employed and the average earnings of Job Corps participants after they left the program.

We measure the additional output resulting from the increased productivity of Job Corps participants using the increase in total compensation, which includes earnings and fringe benefits. We measure the impact of Job Corps from the date of random assignment. Hence, we include not only the additional output produced by Job Corps participants after they leave the program but also the lost output that occurs while the youth are in Job Corps and forgoing employment opportunities.

Additional child care costs, incurred because Job Corps participation prompted more education, training, or work effort, are treated as an offset to the benefits of increased compensation. This takes into account that caring for children is a productive activity and sample members who work more or spend more time in an education or training program can spend less time caring for their children.

Associated with the increase in earnings is an increase in tax payments. Although we did not observe directly how much our sample members paid in taxes, we estimated tax payments based on reported income and household composition.

TABLE II.1

MEASURED BENEFITS AND COSTS OF PARTICIPATING IN JOB CORPS, BY PERSPECTIVE

	Perspective		
	Society	Participants	Rest of Society
Benefits from Increased Output			
Increased Earnings and Fringe Benefits	+	+	0
Increased Child-Care Cost	-	-	0
Increased Taxes	0	-	+
Output Produced During Vocational Training in Job Corps	+	0	+
Benefits from Reduced Use of Other Programs and Services			
Reduced Use of Other Education and Training Programs	+	0	+
Reduced Use of Public Assistance			
Administrative Costs	+	0	+
Benefits	0	-	+
Reduced Use of Substance Abuse Treatment Programs	+	0	0
Benefits from Reduced Crime			
Reduced Crime by Participants	+	0	+
Reduced Crime Against Participants	0	+	-
Program Costs			
Reported Program Operating Costs (Net of Transfers)	-	0	-
Unreported Program Operating Costs (Net of Transfers)	-	0	-
Capital Costs	-	0	-
Student Pay, Food, and Clothing (Transfers)	0	+	-

+ Denotes a benefit
- Denotes a cost
0 Denotes neither a benefit nor a cost

Finally, while enrolled in Job Corps, some youth participate in vocational training projects. While the purpose of these projects is to provide hands-on training, the students often produce an output or a service whose value we included the benefit-cost analysis.

b. Reduced Use of Other Programs and Services

In the absence of Job Corps, youth may receive education and training from other sources. In fact, we found that control group members spent significantly more time in education and training programs other than Job Corps than program group members. Hence, we included as a benefit the estimated savings in costs in other education and training programs from the reduced participation of Job Corps participants.

Job Corps participation significantly reduced the receipt of public assistance benefits. We included in the analysis the monetary value of these benefits, as well the administrative costs of processing the benefits. We also valued the small impacts of Job Corps on the use of substance abuse treatment programs.

c. Reduced Criminal Activity

Job Corps significantly reduced criminal activity of participants both while they were in Job Corps and, to a lesser extent, after they left the program. We found that Job Corps participants were less likely to be arrested and convicted and spent less time incarcerated. Potential victims clearly benefit from the reduction in crime. The reduced use of the criminal justice system that is associated with the decrease in criminal activity is also a benefit. Job Corps participants were also less likely to have a crime committed *against* them. The benefit-cost analysis accounts for this additional safety of Job Corps participants.

2. Costs

Costs fall into three broad categories: (1) program operating costs reported in the Job Corps financial reports, (2) operating costs not reported in the financial reports, and (3) capital costs.

a. Reported Program Operating Costs

Reported program operating costs include costs associated with:

- Academic and vocational training
- Counseling, residential advisors, and other instruction
- Support services, such as meal and laundry service
- Health services
- Administration of the centers
- Overhead operating costs of the centers, including utilities, insurance, and telephone
- OA and placement
- Other costs not incurred by the centers, such as student pay, transportation of residential students between their homes and the centers, and the costs of maintaining SPAMIS

b. Operating Costs Not Included in the Job Corps Financial Reports

Some costs of Job Corps are not included in the program's financial reports. For example, the costs incurred by the national and regional Job Corps offices are not included in financial reports but are associated with the program. In addition, Job Corps receives furniture, equipment, and other items from the General Services Administration (GSA); grants from other government agencies; and donations of food, medical supplies, and a wide variety of other items used by the centers. These represent a use of resources and so are included as a cost. Likewise, we included a cost of the volunteers who work at some centers. Although they are not paid, they forgo other activities to volunteer, and so their volunteered time is a cost of the program.

c. Capital Costs

Job Corps uses a considerable amount of capital—resources that last for more than one year—including land, buildings, furniture, and equipment. While the expenditure on capital may occur in one year, the capital is used by Job Corps for many years after it is purchased. While Job Corps is using it, however, the capital cannot be used in other ways. Hence, the use of the capital imposes a cost each year it is used. We included a measure of this capital cost in the cost of Job Corps.

3. Unmeasured Benefits and Costs

Our approach to the benefit-cost analysis was to value the impacts of Job Corps on measurable, market-valued resources in the economy. This excludes many intangible, hard-to-measure benefits, such as any improvement in the quality of life for participants and their families. For example, we did not attempt to measure the improvement in youths' perception of their health status that results from participation in Job Corps. We captured the benefit of improved health only to the extent that the improvements in health led to an increase in earnings or a reduction in the use of public assistance. We also did not measure the cost of the leisure forgone while Job Corps participants are in the program or employed.[2]

B. DIFFERENT PERSPECTIVES ON BENEFITS AND COSTS

The findings from any benefit-cost analysis will depend on the perspective from which benefits and costs are measured. This is also the case for a benefit-cost analysis of Job Corps. Most of the benefits of Job Corps accrue to the participants of the program, while the government pays most of the costs. Some of the benefits, such as reduced crime, can affect private citizens as well. Hence, the benefits and costs to participants will differ considerably from the benefits and costs to the government and the rest of society.

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[2] Greenberg (1997) discusses how the cost of forgone leisure can be included in a cost-benefit analysis.

1. Three Different Perspectives

We examine the benefits and costs from three different perspectives:

1. ***Society.*** To compare benefits and costs from society's perspective, we aggregated benefits and costs over everyone. Examining benefits and costs from society's perspective allows us to determine whether the aggregate benefits from the program are greater than the resources used by the program, abstracting from who enjoys the benefits of the program and who bears its cost. The other perspectives examine benefits and costs for only a subset of society. Because this perspective aggregates benefits and costs over everyone in society, this is the most relevant perspective for policymakers.
2. ***Participants.*** Comparing the benefits and costs from the perspective of Job Corps participants allows us to address whether participating in Job Corps is a good investment for the youth themselves. While the participants do not pay to attend Job Corps, they forgo opportunities to work while in the program.
3. ***Rest of Society.*** This refers to everyone other than the participants. While participants obtain many of the benefits of the program, the rest of society bears most of the cost. Comparing the benefits and costs from the perspective of the rest of society allows us to address to what extent the costs of Job Corps are offset by its benefits to the rest of society. These include increased tax revenue, reduced use of other programs and services, and lower crime. Most, but not all, of the benefits and costs to the rest of the society accrue to the government as changes in taxes or government spending.

A positive benefit from one perspective could be a negative benefit (cost) from another perspective. For example, an increase in tax payments by participants is a benefit to the rest of society but a cost to participants. The benefit (or cost) to society is just the sum of the benefit (or cost) to participants plus the benefit (or cost) to the rest of society. Table II.1 indicates for each benefit and cost whether it is expected to be a benefit or cost from each different perspective. A "+" indicates a benefit, a "-" indicates a cost, and a "0" indicates that there is neither a benefit nor a cost from that perspective.

2. Transfers

Some effects of Job Corps lead to a benefit for one group (participants or the rest of society) but an equal cost to another. While these effects may redistribute resources among different members of society, they do not affect the total resources in society. We refer to the benefits and costs from these impacts as *transfers*. Transfers can be benefits or costs from the perspective of participants and the rest of society, but are neither a benefit nor a cost to society as a whole. The four most important transfers in this benefit-cost analysis are:

1. ***Taxes***. The increase in tax payments as a result of participation in the program is a cost to Job Corps participants but an equal benefit to the government (the rest of society).
2. ***Student Pay***. While in Job Corps, participants are paid an allowance and may receive financial bonuses. This pay is a benefit to participants and an equal cost to the government (the rest of society).
3. ***Public Assistance***. The reduction in the use of public assistance from participating in Job Corps is also a cost to Job Corps participants. This cost to participants is offset completely by the benefit to the government (the rest of society).[3]
4. ***Crimes Against Job Corps Participants***. The impact analysis found that Job Corps participants are less likely to be victims of crime. We assume that the reduction in crimes committed against Job Corps participants is offset by an increase in crimes committed against other victims. The benefit to participants is therefore offset completely by a cost to the rest of society. The reduction in crime committed by participants is not a transfer.

We discuss each of these transfers in more detail in later chapters of the report.

C. APPROACH TO MEASURING BENEFITS AND COSTS

We measured most of the benefits by multiplying an estimate of the impact of the program with an estimate of the dollar value of the impact. We measured most of the costs of Job Corps using data on program expenditures and student attendance. We estimated a cost of attending Job Corps for each Job Corps participant in our sample. The average cost of attending Job Corps for these sample members was then used as a measure of the cost of the program. In the rest of this section, we discuss in more detail the impact estimates, the dollar value placed on the impact estimates, and our use of average rather than marginal costs.

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[3] Not all the benefit from a reduction in public assistance is a transfer. The total benefit to the government exceeds the cost to the participant, because the government also benefits from the reduction in the costs of administering the public assistance.

1. Impact Estimates

The estimates of the impacts of Job Corps on earnings, use of other programs, and criminal behavior by participants and against participants were the starting point for measuring most of the benefits of Job Corps. We used the estimates based on data from the baseline and 12-, 30-, and 48-month follow-up interviews, presented in Schochet et al. (2001).

The benefits were based on estimates of the impacts per *participant*—a youth who was found eligible *and* showed up at a center.[4] We compared the benefits per participant with the costs per participant. We could have instead used the impacts on all eligible applicants and compared the benefits per eligible applicant with the cost per eligible applicant. As both approaches yield the same findings, we present both benefits and costs as the benefits or costs per *participant* because it is more intuitive.

We measured benefits using the relevant impact estimate even if the estimate was not significantly different from zero at conventional statistical significance levels. Because the impact estimate is an unbiased estimate of the true program impacts, we obtain a more accurate estimate of the benefit using an imprecise impact estimate than we would from assuming the benefit is zero. However, we test the sensitivity of our estimates of the benefits to variations in the magnitude of the impact estimates using information on the standard errors of the estimates.

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[4] As described in Chapter I and detailed in Schochet et al. (2001), we also adjusted for control group members who enrolled in Job Corps.

In most cases, we used estimates of the impacts for each of the four years after random assignment (referred to as years 1 to 4). However, we used an estimate of the quarterly impacts on earnings, which are estimated with a higher degree of statistical precision. Some impacts that measure the effect of Job Corps on relatively rare events are estimated less precisely. For these, we used estimates of the impacts aggregated over all four years.

2. Converting Impacts into Benefits and Costs with Dollar Values

Our basic approach for measuring the benefits and costs of Job Corps was to value all the impacts at market prices. For example, we valued the additional output produced by Job Corps participants using the amount that employers are willing to pay for the additional output, the cost of the employee's compensation. The advantage of using market prices is that they are readily available in most cases, straightforward to use, and provide a good measure of the value that society places on the impacts. When no market exists for a benefit or cost, we estimated the market value of the resources used in the activity associated with the benefit or cost. For example, when estimating the benefit from a reduction in the use of the criminal justice system, we based the estimate on the value of the resources used for investigations, booking and arrests, prosecution and trial, and sanctions.

Our estimates of the dollar value of an impact are based on estimates from a wide variety of different studies. In cases where more than one estimate was available, we were usually able to identify the most appropriate estimate. In the few instances when more than one equally appropriate estimate existed, we used either an average of the estimates or, if there was considerable uncertainty over the estimate, the one that was least favorable to Job Corps (the one that led to lower benefits or higher costs).

3. Use of Average Costs

As we are estimating the benefits from *changes* in the use of Job Corps, we should compare them with the *marginal* costs of the program—the additional cost of expanding the program. Instead, because data on marginal costs are not available for Job Corps, we use the *average* cost of the program. Average costs are typically higher than marginal costs because some costs are fixed and do not vary with the number of students in the program. However, in the long run the differences between the average and marginal costs are probably small. While many inputs into the program, such as classroom space, are fixed in the short-run, most of these inputs do vary eventually with the number of students served.

D. EXTRAPOLATING BENEFITS AFTER THE OBSERVATION PERIOD

Because Job Corps is designed to have long-lasting effects on the lives of youth, We expect many of its benefits to accrue beyond the first three or four years after the youths leave the program. We observed the impacts of the program for four years after random assignment, which for most participants includes about three postprogram years. However, for some participants who did not enter the program soon after random assignment or who stayed in it longer, the post-observation period may be considerably less than three years.

We needed to make assumptions about whether and how impacts observed during the four-year observation period would persist. This is extremely important for this benefit-cost analysis, because we found that the benefits that accrue within the observation period are below costs. Yet a fair assessment of Job Corps must use a long-term perspective.

Our basic approach was to assume that the only benefits to continue after the observation period are those that did not decline during the observation period. As we describe in the next chapters, we found that the impacts on the use of education and training programs, the use of public assistance, and criminal activity did decline during the observation period. Hence, we assumed that none of these benefits persist in the post-observation period. This is a cautious assumption, because we expect that some impacts will continue for several years after random assignment. However, we ignored these benefits in the post-observation period because of the paucity of information on how these impacts might decline and the small dollar value of these benefits at the end of the observation period.

We did, however, assume that the impacts on earnings, taxes, and use of child care persist in the post-observation period. The impacts on earnings did not decay at all during the four-year observation period. Moreover, as we will discuss in Chapter III, evidence from other studies suggests that earnings impacts persist. The impacts on taxes and child care are closely linked to the impacts on earnings.

E. COMPARING BENEFITS AND COSTS THAT OCCUR AT DIFFERENT TIMES

While nearly all the costs of Job Corps occur while a youth is participating in the program, the benefits from the program may continue for many years after the youths leave the program. This section describes how we compared the costs that occur in the first year or two after random assignment with the benefits that may occur later.

1. Presenting All Benefits and Costs in Constant Dollars

Because of inflation, a current dollar is worth more than a future dollar. For this reason, we converted every year's dollar measures of benefits and costs into 1995 dollars using the Gross Domestic Product chain-price index. Because this index measures changes in prices of *all* goods and services in the U.S. economy, it is the best one for converting into constant dollars the many different types of benefits and costs measured in this study.

2. Discounting Future Benefits

Even after controlling for inflation, a dollar today is worth more than a dollar in the future, because a dollar received today can be invested to produce a yield, but a future dollar cannot. To take this into account, we applied a *discount rate* to all benefits and costs that accrued after the first year of the study observation period.[5]

While it is widely agreed that benefits and costs that accrue in the future should be discounted, there is some disagreement about which discount rate to use. The theoretically best one to use, determined by the *shadow-price method,* will vary depending on the program being evaluated.[6] This discount rate depends on three factors: (1) whether the program is financed by increases in taxes, increases in debt, or reductions in spending on other government programs; (2) the extent to which financing the program displaces investment or consumption in the private sector; and (3) how any displacement in investment in the private sector affects future consumption in the private sector. Unfortunately, a major drawback of this method is that the information needed to apply the shadow-price method is usually not available. Indeed, it is not available for this evaluation of Job Corps.

Many researchers have recommended discounting using the U.S. Treasury borrowing rate when the shadow-price method cannot be used (Lind 1990; Hartman 1990; Lyon 1990; and General Accounting Office 1991). For this benefit-cost analysis, we used a discount rate of 4 percent, approximately the real rate of return on 30-year Treasury bonds.[7] (We use a *real* rate of return—a rate of return adjusted for inflation—because the benefits and costs are measured in constant 1995 dollars.) The advantages of the Treasury borrowing rate are that it is easily available, it can be interpreted as the opportunity cost of the government borrowing to fund a project, and, if the economy is sufficiently open to international flows of capital that government borrowing does not significantly raise interest rates, it gives similar results to the shadow-price method (Edwards 1985; and Lind 1990). Both the Congressional Budget Office (CBO) and the General Accounting Office (GAO) also recommend the use of the Treasury borrowing rate (Hartman 1990; and General Accounting Office 1991).

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[5] We describe how we apply the discount rate in Appendix C.

[6] This shadow-price method was developed by Dasgupta et al. (1972); Bradford (1975); and Lind (1982).

[7] Between 1990 and 2000, the average real rate of return on 30-year Treasury bonds was 3.9 percent. It was 4.2 percent in 2000. These rates were obtained from OMB.

The Office of Management and Budget (OMB) uses a real discount rate of 7 percent (Office of Management and Budget 1992). Their justification is that 7 percent is approximately the real pretax return on private investment and that the government should not invest in a program if it could obtain a higher rate of return from the private sector. Many view this as overstating the return needed for an attractive government investment (for example, Gramlich 1981).

As many of the benefits of Job Corps are long-term, the choice of the discount rate does make a significant difference to the estimates of the magnitude of the benefits from Job Corps. However, as we show in Appendix B, the benefits of Job Corps exceed its costs unless the discount rate is 10.5 percent or higher.

F. SENSITIVITY OF THE BENEFIT-COST ESTIMATES

In our estimates of the benefits and costs, as in most benefit-cost analyses, there are many sources of uncertainty, which fall into three broad categories:

- ***Deviations of the Impact Estimates from the True Program Effects.*** Although the impact estimates are unbiased estimates of the true program effects, there is still some uncertainty surrounding them, because they were made using a sample rather than the whole population of Job Corps-eligible applicants. The standard error of each impact estimate is a measure of this uncertainty.
- ***Uncertainty Surrounding the Factors Used to Convert the Impacts into Dollar Values.*** These factors are themselves estimated from samples and so have a standard

error. The factors may not correspond exactly to the ideal measure of the dollar value of the benefits or costs.

- ***Other Assumptions.*** Throughout the analysis we made many assumptions. While we believe these assumptions are appropriate, there is, of course, some uncertainty surrounding them? The most important are the assumptions related to the extrapolation of the earnings impacts after the observation period.

This report presents our *benchmark* estimates of the benefits and costs of Job Corps. These are the estimates based on the best available data and, in our judgment, the most appropriate assumptions. However, recognizing the uncertainty inherent in these estimates and assumptions, we tested the sensitivity of our estimates of the benefits and costs to alternative estimates and assumptions. To test for the sensitivity of our findings to deviations of the impact estimates from the true program effects, we computed the major benefits using the endpoints of a statistical confidence interval that represents the range that we can be fairly certain contains the true impact. We also tested for the sensitivity of our findings to changes in our estimates of the factors that convert impacts to benefits or costs and other assumptions. These sensitivity analyses are presented in Appendix B and summarized in each of the next five chapters. These sensitivity analyses play a role analogous to that of standard errors in the estimates of the impacts of Job Corps.

III. BENEFITS FROM INCREASED OUTPUT

One of the major goals of Job Corps is to increase the employment and earnings of the youth it serves. Our study finds that it does indeed achieve this goal. At the end of the study observation period, Job Corps participants were nearly 5 percent more likely to be employed than members of the control group and, when employed, earned an average of about 22 cents more per hour (Schochet et al. 2001). In addition, employers were more likely to offer Job Corps participants fringe benefits, such as health insurance and retirement plans. This chapter presents our estimates of the value of the increase in the output of Job Corps participants.

We estimated that Job Corps increases output by about $27,500 per participant. In the first year of the observation period, however, output from employment decreased by about $1,900, which reflects the employment opportunities Job Corps participants had to forgo while enrolled in the program. This initial loss was offset by an increase in output of more than $2,600 in the remaining three years of the observation period, when most Job Corps participants had left the program. Based on observed impacts during the observation period and findings from other studies, we assume that the impact of Job Corps on earnings will persist throughout the sample members' working lives. As the observation period is short relative to the youths' lives, we expect most of the benefits from increased output to accrue afterward.

The additional time Job Corps participants spent in both training and employment meant less time spent caring for children in the home and a greater need for child care outside the home. We estimated that Job Corps increased child care costs by about $600 over each participant's working lifetime. In measuring benefits from Job Corps, we subtracted these additional child care costs from our measure of increased output from employment.

As Job Corps participants earn more on average, they also pay more in taxes. We estimated that throughout their working lives, Job Corps participants pay about $9,700 more in federal, state, and local taxes than they would otherwise have paid.

While enrolled in vocational training in Job Corps, participants may also produce some goods and services as a by-product of the training. We included the value of this output, which was about $200 per participant, in our estimate of the increased output from Job Corps.

The rest of this chapter is organized as follows. Section A describes our estimates of the value of the increased output from employment during the observation period. Section B presents our rationale for, and approach to, estimating the benefits of the increased output that occurs after the observation period. Section C contains our estimates of the impact of Job Corps on child care costs and Section D our estimates of the impact on tax payments. Section E contains our estimates of the value of the output Job Corps participants produce while conducting vocational training projects in Job Corps. Section F concludes the chapter with a summary of the value of the increased output and a discussion of the sensitivity of the estimates to some important assumptions.

A. INCREASED OUTPUT FROM EMPLOYMENT DURING THE OBSERVATION PERIOD

Job Corps significantly increased earnings. Table III.1 presents its impacts on earnings by quarter after random assignment. In the first year of the observation period, Job Corps reduced the average earnings of participants by nearly $1,600, which reflects the forgone employment opportunities of participants while they were enrolled in Job Corps. Beginning in quarter 7, average earnings of program group members exceeded those of control group members, and by the fourth year after random assignment, average annual earnings of participants were about

TABLE III.1

BENEFITS FROM THE INCREASED OUTPUT OF JOB CORPS PARTICIPANTS DURING THE OBSERVATION PERIOD
(1995 Dollars)

Quarter After Random Assignment	Average Earnings of Program Group	Average Earnings of Control Group	Estimated Impact on Quarterly Earnings per Participant[a]	Estimated Impact on Quarterly Compensation per Participant
1	$566	$852	-$398***	-$477***
2	753	1,136	-533***	-640***
3	1,009	1,290	-391***	-470***
4	1,201	1,378	-247***	-297***
5	1,414	1,530	-160***	-182***
6	1,648	1,681	-44	-42
7	1,850	1,797	75	103
8	1,993	1,910	116*	152*
9	2,142	2,025	163***	211***
10	2,231	2,080	211***	268***
11	2,419	2,213	287***	363***
12	2,551	2,322	319***	402***
13	2,669	2,444	313***	397***
14	2,727	2,525	282***	361***
15	2,778	2,564	298***	379***
16	2,828	2,592	328***	415***

SOURCE: Baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews.

[a] Estimated impacts per Job Corps participant are measured as the estimated impact per eligible applicant divided by the difference between the proportion of program group members who enrolled in Job Corps and the proportion of control group members who enrolled in Job Corps during their three-year restriction period. Standard errors for these estimates were inflated to account for the estimation error in the Job Corps participation rate and the control group crossover rate.

* Significantly different from zero at the .10 level, two-tailed test.
** Significantly different from zero at the .05 level, two-tailed test.
*** Significantly different from zero at the .01 level, two-tailed test.

$1,200 higher than they would have been in the absence of Job Corps, an impact of about 12 percent.

1. Approach to Measuring Output

We measure a worker's output by the full cost to the employer of the worker's compensation. The rationale for this measure is that economic theory predicts that employers will hire additional workers until the value of goods and services produced by the last-to-be-hired worker is equal to the cost of employing that worker. The cost to the employer includes wages and salaries and any fringe benefits the employer provides.

We assume that the impacts of Job Corps on earnings represent an increase in output for the economy as a whole. We assume that the additional employment by Job Corps participants does not *displace* employment by other workers in the economy. If such displacement occurred, our approach would overstate the benefits from Job Corps. However, as unemployment was at record lows during the study, and as Job Corps aims to train youths only for occupations in high demand, any displacement effects that occurred were probably small.

2. Estimates of the Value of Fringe Benefits

Fringe benefits are a major component of the employer costs of the workers' compensation. They fall into six main categories:[1]

1. ***Paid Leave.*** This includes paid days off work for holidays, vacations, illness, or other reasons employers pay workers when they are not working.

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[1] In addition, employers may provide nonfinancial benefits, such as unpaid leave and flexible work schedules. These benefits may be costly to the employer, but because it is particularly difficult to estimate their cost, we did not include them in our estimates of the cost of fringe benefits.

2. ***Supplemental Pay.*** This includes bonuses and payments for work in addition to the regular schedule.
3. ***Health Insurance.*** This includes health insurance and membership in a Health Maintenance Organization (HMO) or similar plan.
4. ***Retirement and Savings Benefits.*** This includes both defined benefit and defined contribution plans.
5. ***Legally Required Benefits.*** This includes Social Security, federal and state Unemployment Insurance (UI), and Workers' Compensation.
6. ***Other Benefits.*** This includes life and disability insurance, child care assistance, employer-provided transportation, and tuition reimbursements.

The cost of paid leave and supplemental pay is already included in our measure of earnings. In the interviews, sample members were asked about how many weeks, days per week, and hours per day they *usually* worked. They were instructed to include paid leave and exclude only time spent on unpaid leave. Sample members were also asked to include any supplemental pay when reporting their wage rates or earnings.

The costs of the other fringe benefits were not included in our measure of earnings, and we did not collect data on how much it cost the employers of members of our research sample to provide those fringe benefits. Instead, we based our estimates for members of our sample on average costs of fringe benefits from published sources.[2]

Fringe benefits, other than the legally required benefits, are far from universally available. Table III.2 presents the proportion of workers, nationwide and in our sample, who were offered health insurance and retirement and savings benefits. For our sample, we used data on the benefits on the most recent job held by members of the program and control groups in quarters

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[2] A fuller discussion of the estimates of the costs of fringe benefits is provided in Appendix D.

TABLE III.2

AVAILABILITY OF FRINGE BENEFITS FOR ALL U.S. EMPLOYEES AND RESEARCH SAMPLE MEMBERS

(Percentage Receiving Benefit)

Fringe Benefit	All U.S. Employees	Program Group	Control Group	Program-Control Group Difference
		Most Recent Job in Quarter 10		
Health Insurance	60	49.9	48.3	1.6
Retirement and Savings Benefits	58	41.0	38.1	2.9**
		Most Recent Job in Quarter 16		
Health Insurance	60	50.5	48.3	2.2*
Retirement and Savings Benefits	58	41.6	38.0	3.6***

SOURCE: Data on the availability of fringe benefits for all U.S. employees were obtained from Bureau of Labor Statistics (1999). Data on the availability of fringe benefits for members of the Job Corps research sample were obtained from Schochet et al. (2000), Table VI.8 and Schochet et al. (2001), Table VI.8.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
*** Significantly different from zero at the .01 level, two-tailed test.

10 and 16. Compared to the average employee, control group members were about 12 percentage points less likely to be offered health insurance and 20 percentage points less likely to be offered retirement and savings benefits. This is not surprising, since the research sample members are just beginning their working career and typically have low-wage jobs. A comparison of the fringe benefits offered to members of the program and control groups suggests that participation in Job Corps increased the percentage of research sample employees who were offered health insurance by about 2 percentage points and the percentage who were offered retirement and savings benefits by 3 to 4 percentage points.

Although the Bureau of Labor Statistics (BLS) produces nationwide estimates of the cost of fringe benefits for all U.S. employees (including those who do not receive the benefits), there are no good estimates of the cost of fringe benefits for *low-wage* workers similar to the workers in our research sample. Therefore, we based our estimates of the average cost of fringe benefits for our sample members on several assumptions, including that the average cost as *a percentage of earnings* of offering each fringe benefit to employees in our sample is the same as the average cost of offering the fringe benefit to all U.S. employees who are offered the benefit.[3]

Using data from two nationwide establishment surveys conducted annually by the BLS (the *Employer Costs for Employee Compensation* and the *Employee Benefits Surveys*), we estimated the average cost of fringe benefits for all employees offered the benefit. On average, over all civilian U.S. employees who are offered the benefit, health insurance costs about 12 percent of earnings, retirement and savings benefits cost about 8 percent, and legally required benefits cost slightly more than 10 percent. We estimated the average cost of fringe benefits as a percentage of earnings for all employees in our program and control group (not just those offered the benefit) by multiplying (1) the proportion of all employees in each group who are offered each benefit, and (2) the estimates of the cost of fringe benefits as a percentage of earnings for all U.S. employees who are offered the benefits. For example, the cost of health insurance for program group members in quarter 10 (6 percent of earnings) was estimated by multiplying the proportion of program group members who were offered health insurance (0.499) by the estimate of the cost of health insurance for those who were offered it (12 percent of earnings).

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[3] If, in reality, the costs of fringe benefits as a percentage of earnings are higher than average for our sample members because their earnings are low, we will be understating the cost of the fringe benefits and the output produced by our sample members.

We found that the total fringe benefit package (excluding paid leave and supplemental pay) costs about 20 percent of earnings (Table III.3). The average cost varied by about 0.5 to 0.6 percentage points between the program and control group, which reflects the greater availability of fringe benefits to members of the program group. The cost of fringe benefits as a percentage of earnings for the most recent job held fell slightly between quarters 10 and 16 in both research groups. This is consistent with the overall decline that occurred in the late 1990s in the average cost of fringe benefits as a percentage of earnings (Appendix D).

TABLE III.3

ESTIMATES OF THE COST OF FRINGE BENEFITS AS A PERCENTAGE
OF EARNINGS FOR ALL SAMPLE MEMBERS WHO WORK

	Program Group	Control Group
Most Recent Job Held in Quarter 10	20.6	20.1
Most Recent Job Held in Quarter 16	20.1	19.5

SOURCE: Appendix Table D.2.

To place these estimates in context, in 1999 fringe benefits cost about 22.5 percent of earnings for all employees and about 17.0 percent of earnings for all part-time private sector employees (Bureau of Labor Statistics 1999). While members of our Job Corps research sample received fewer benefits on average than all U.S. employees, they received significantly more benefits than part-time workers. Between 1994 and 1997, health insurance was available for only 11 percent of part-time private sector employees, and retirement and savings benefits were available for only 20 percent of these employees (Bureau of Labor Statistics 1999). Even in quarter 10, 48 percent of control group members were offered health insurance and 38 percent were offered retirement and savings benefits.

Our estimates of the costs of fringe benefits relied on many assumptions. However, we show in Appendix B that even if we ignore fringe benefits completely, the scenario most unfavorable to Job Corps, our conclusion that the benefits from Job Corps exceed its costs still holds.

3. Estimates of Increased Output During the Observation Period

Estimates of the impacts of Job Corps on compensation are presented in Table III.1. These estimates were calculated from the difference between program and control group members in compensation—earnings plus the cost of fringe benefits. In the first year after random assignment, quarters 1 to 4, we assume that the cost of fringe benefits for both program and control group members was the same, and equal to the cost for control group members in quarter 10 (20.1 percent of earnings).[4] In quarters 5 through 10, the estimates of the cost of fringe -

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[4] Even at the 12-month interview, we found that more fringe benefits were available to program group members than control group members. However, as most participants spent most of year 1 in Job Corps, we assume cautiously that there was no impact on the availability of fringe benefits in the first year.

benefits were based on the most recent job held in quarter 10 (20.6 percent of earnings for the program group and 20.1 percent of earnings for the control group). In quarters 11 to 16, estimates of the cost of fringe benefits were based on the most recent job held in quarter 16 (20.1 percent of earnings for the program group and 19.5 percent of earnings for the control group).

Job Corps reduced compensation in year 1 by $1,883. However, this reduction was offset by an increase in compensation of $2,558 in the remaining three years of the observation period.

B. INCREASED OUTPUT AFTER THE OBSERVATION PERIOD

Job Corps is an intensive and comprehensive program that aims to have long-term impacts on the lives of its participants. Therefore, we would not expect the program to have impacts on earnings in only the first four years after random assignment, when participants have been in the labor force for only a few years. In fact, the impacts on earnings are quite large at the end of the observation period and did not decline during it. However, we currently have no direct evidence from our research sample on how long these impacts will persist or whether or to what degree they will decline over time. Instead, our estimates of the benefits after the observation period are based on *assumptions* on how the earnings impacts will persist.

These assumptions are extremely important in this benefit-cost analysis. The conclusion that the benefits from Job Corps exceed its costs requires that the earnings impacts persist after the observation period. Changes in the assumptions about how the earnings impacts decline over time can make a large difference to the estimates of the net benefits of Job Corps.

The rest of this section describes our assumptions about the persistence of earnings impacts, as well as our rationale for making them. While we cannot test these assumptions with information currently available, we may be able to test them in the future. We are currently collecting earnings data on research sample members from Social Security and UI administration records. These records may allow us to estimate the impact on earnings for a subsequent year.

We expect to be able to obtain these administrative earnings data on our research sample members indefinitely.

1. Time-Pattern of Earnings Impacts During the Observation Period

Earnings impacts do not decline during the observation period. The time-patterns of quarterly earnings of members of the program and control group are presented in Figure III.1. Program group members earned significantly less than control group members for the first five quarters after random assignment, which reflects the forgone earnings of program group members while they were participating in Job Corps. Program group members began to earn more than control group members in the seventh quarter after random assignment, and by the end of the second year after random assignment, they earned significantly more on average than the control group members. The impacts grew in the third year after random assignment and then remained fairly *constant* in the fourth.

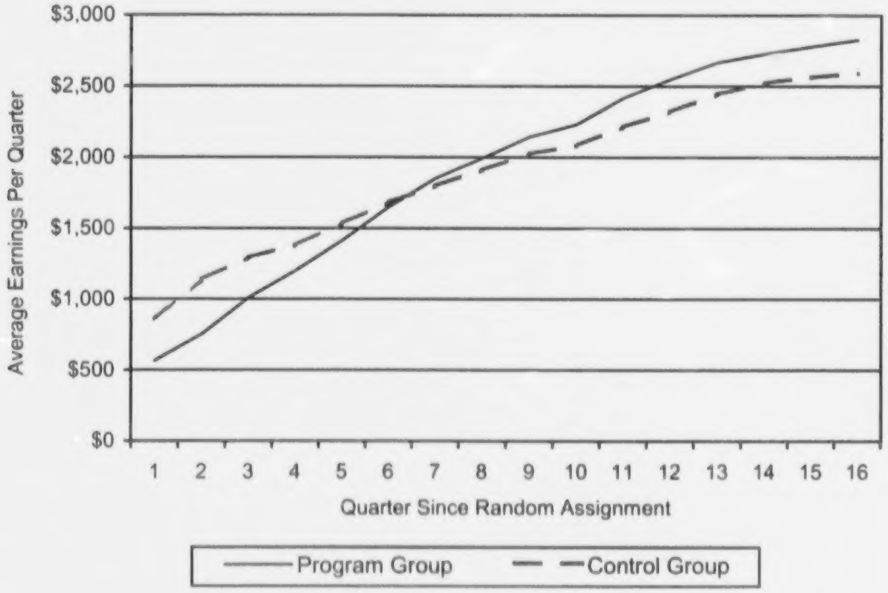
2. Evidence on the Time-Pattern of Earnings Impacts from Other Studies

Our assumption on how the earnings impacts persisted after the observation period was based mainly on evidence from other studies. However, evidence on the time-pattern of earnings impacts from participation in training programs similar to Job Corps is extremely limited. This is partly because Job Corps is a unique program—most other training programs are not nearly as intensive or comprehensive. It is also because few program evaluations have collected long-term earnings data on participants.

Long-term studies of other training programs show mixed results. Depending on the training program, the evaluation, and the particular population under study, the impacts of job training decay rapidly or persist throughout the follow-up period.

FIGURE III.1

AVERAGE EARNINGS OF PROGRAM AND CONTROL GROUP MEMBERS, BY QUARTER
(1995 Dollars)



All available evidence suggests that the returns to an additional year of school persist, without any significant decline, throughout a person's working lifetime. This finding is relevant to the Job Corps sample because like school, Job Corps teaches multiple and general skills. In addition, the amount of education and training received by students in Job Corps is similar to the instruction received during a year of secondary school.

a. Evidence on the Time-Pattern of the Returns to Training

To motivate our assumptions about the persistence of earnings impacts, we review four studies on the long-term impacts of training:

1. ***Classroom Training Under the Manpower Development Training Act (MDTA).*** MDTA provided federally sponsored employment and training services, such as classroom training in specific occupations, referrals to vocational and technical schools, and subsidized on-the-job training. Ashenfelter (1978) used Social Security

Administration data to examine the impacts on earnings of MDTA classroom training received in 1964. At the time of this study, MDTA was geared to the most easily trained, not to disadvantaged, populations. Over the five post-training years examined, Ashenfelter found a rapid decline in the impacts on earnings of men (equivalent to about 16 percent per year), but no decline in the impacts on earnings of women. Because Ashenfelter's study was not a randomized experiment, the findings depend on statistical modeling. Bloom (1984) reestimated the impacts using different statistical models and found no decay in earnings impacts for either men or women.[5]

2. ***Private Sector Job-Specific Training.*** Using the National Longitudinal Study of Youth (NLSY) from 1969, 1973, 1975, 1978, and 1980, Lillard and Tan (1992) examined the impact on earnings of private sector job-specific training, including training provided at private companies, on the job, and at vocational trade schools. They examined the impact on all young workers, not a disadvantaged population, and found that earnings increased in the year after training by 11.9 percent, but this impact on earnings decreased rapidly by 1.1 percentage points each year after training.

3. ***National Supported Work (NSW) Demonstration.*** The NSW demonstration, which operated from 1975 to 1979, was designed to provide subsidized employment to a disadvantaged population. Counselors provided participants with support, training, and supervision while they were in subsidized employment. Couch (1992) used Social Security Administration earnings data to estimate the impacts of the NSW demonstration for the eight years after training was received. He found that for women, the impact of the NSW demonstration on earnings was significant and did not decay over the eight observation years. He found that the demonstration had no significant impact on the earnings of youths in any of the post-training years.

4. ***Center for Employment Training (CET) in the Minority Female Single Parent (MFSP) Demonstration.*** The MFSP demonstration, which operated between 1982 and 1988, offered minority single mothers services such as job skill training, basic skills and job skill assessments, counseling, remedial education, placement assistance, and child care assistance. At 60 months after random assignment, further data collection was conducted at the CET in San Jose, California, the demonstration project found to be most successful based on data collected 30 months after random assignment (Burghardt et al. 1992). The 60-month followup revealed that the impact on earnings found at 30 months persisted at 60 months, with a small decline of about 2.4 percent per year (Zambrowski and Gordon 1993).

Each of these programs studied is different in content and focus from Job Corps and, with the exception of the NSW demonstration for youth, serves a different population. However, together these studies do suggest that earnings impacts persist when the training improves multiple, more general skills (such as the CET demonstration program) and do not persist when it improves only one or two specific skills (such as the MDTA classroom training or the private sector job-related training). Also, the studies suggest that when the impacts of training decay, the decay begins quickly after training: it is evident in the second year after training in the study of private sector job-related training and in the third year after training in the MDTA study.

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[5] Bassi (1984) argued that Bloom's statistical models were not necessarily superior to Ashenfelter's.

b. Evidence on the Time-Pattern of the Returns to Schooling

A considerable literature exists on the effects of an additional year of school on earnings.[6] Most of it has focused on estimating the effect on lifetime earnings of an additional year of school. While the estimates of the returns to schooling vary depending on the population studied and the statistical techniques used, most estimates lie between 8 and 12 percent, with an average of about 10 percent.[7] Most of the studies of the returns to schooling assume that the returns persist for the person's entire working life.

To test this assumption for disadvantaged youths, we estimated earnings models that allowed for the annual returns to an additional year of school to change over the person's lifetime. We used national longitudinal earnings data for eight cohorts of disadvantaged youths. We estimated the following earnings model, which is similar to the one proposed by Mincer (1974) and others:

$$\ln(EARN) = a + b(EDUC) + c(AGE) + d(AGE^2) + e(AGExEDUC) + u$$

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[6] Card (1999) provides a summary of this literature.
[7] Tables 4 and 5 of Card (1999).

where *EARN* is annual earnings, *EDUC* is years of schooling, *AGE* is the person's age, and *u* includes all additional determinants of earnings, such as school quality, ability, and other personal characteristics. Together the coefficients *b* and *e* capture the effect of education on earnings. The coefficients *c, d,* and *e* capture the effect of experience on earnings. Studies have found that *c* is positive and *d* is small and negative, which suggests that earnings increase for most of the person's lifetime but at a decreasing rate (Willis 1986).

The coefficient *e* is of most interest to us, which is usually assumed to be zero, because it captures changes over the person's lifetime in the returns to schooling. A negative value of *e* would suggest that the effect of additional schooling on earnings fades as a person ages. A positive value of *e* would suggest that the effect of additional schooling on earnings becomes more important as a person ages.

We found that the returns to an additional year of school vary little over a person's lifetime. The estimated value of *e* is small and not statistically significantly different from zero.[8] For male workers, who make up about 60 percent of Job Corps participants, the return to a year of school rises slightly as they age. For females, the return falls slightly as a percentage of earnings as they age. For both groups, the return measured in dollars increases with age. These conclusions hold using different types of statistical models. A full discussion of this analysis is provided in Appendix E.

3. Approach to Extrapolating the Increased Output

Our approach to extrapolation assumes that the dollar value of the annual impact on compensation in the last year of the observation period ($1,550) persists without declining throughout the average participant's working lifetime. Although the evidence from long-term studies of training and education programs is not conclusive, assuming that the dollar value of the impacts does not decline is the most appropriate, for the following reasons:

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[8] Using the 1970 Census, Heckman (1976) also found that the return to education for white college-educated males decayed with age at a rate of less than 1 percent.

- ***The Impacts from Job Corps Did Not Decline in the Observation Period.*** As described above, the earnings impacts did not decline within the observation period, which accounts for on average three post-program years. The long-term studies of training suggest that when impacts decay, they begin declining quite soon after training. The impacts from MDTA were found to decline in the third post-training year, and the impacts from private sector training were found to decline in the second post-training year.

- ***Job Corps Teaches Youth Multiple Skills.*** We found that participants in Job Corps engaged in many hours of academic and vocational training (Schochet et al. 2001). Hence, the studies of schooling and more general training programs are more applicable to Job Corps than are the MDTA classroom training and private sector training, which focus on teaching one or two specific skills. As described above, the returns to schooling persist, and the impacts of training programs that are more general in nature seem to be more likely to persist.

- ***Job Corps Improved Functional Literacy and Numeracy Skills.*** In conjunction with the 30-month follow-up interviews, we conducted literacy and numeracy tests on over 2,000 randomly-selected sample members (Glazerman et al. 2000). We used tests developed by the Educational Testing Service to assess literacy and numeracy skills that are used in the workplace (referred to as *functional* skills). Job Corps had positive impacts on all three domains tested—prose, document, and quantitative. Impacts on the prose and quantitative literacy scales were statistically significant at the 10 percent level. These findings suggest that Job Corps improves general basic skills, which are less likely to become obsolete over time than narrow, job-specific training.

- ***The Earnings Impacts from Participation in Job Corps Were Similar to Those of the Returns to Schooling.*** Although Job Corps is quite different from a regular school, the impact of attending Job Corps was similar to the impact of one more year of schooling. We find that Job Corps participants received on average about 1,000 hours of training in academic and vocational skills. This is similar to the hours spent in one year of secondary school (U.S. Department of Education 2000). The 12 percent impact of Job Corps on earnings observed in year 4 of the observation period is within the range of estimates of the returns to schooling, although it is at the high end. The similarity of both the amount of training and the impacts suggests that the impacts from Job Corps participation may persist in the same way as the returns to schooling. In addition, Job Corps increased the probability of receiving either a high-school diploma or GED certificate by 18 percentage points for youth who did not have a high school credential at random assignment (Schochet et al. 2001).

Our approach assumes persistence in the *dollar* value of the impact, rather than the proportionate impact. As earnings usually increase with the worker's age, our assumption implies a decreasing *proportionate* impact on earnings. Since the studies of the returns to schooling usually assume a constant proportionate impact on earnings, ours is a cautious assumption. Mincer (1974) showed that on average earnings increase by 8.1 percent in the first year in the labor force and continue to increase at a decreasing rate—the percentage increase decays by 0.24 percentage points each year. Assuming the age-profile of earnings of members of our research sample followed a similar pattern, our use of a constant dollar impact to extrapolate the benefits of Job Corps is the same as assuming that the 12 percent impact on earnings observed in the 4th year after random assignment decays to about 10 percent by the 7th year after random assignment, and to about 6 percent in the 17th year. In Appendix B, we show that the size of the estimated benefits from Job Corps would increase substantially if we had assumed a constant 12 percent impact on earnings rather than a constant dollar value impact.

If earnings impacts decline rapidly after the observation period, however, the estimated increase in output will not be large enough for the benefits from Job Corps to exceed its costs (Appendix B). For example, if earnings impacts decline at the same rate as they did for men who had participated in classroom MDTA training, the output after the observation period would not be sufficient for benefits to exceed costs. However, our conclusion that benefits exceed costs holds as long as earnings impacts do not decline each year by more than 8 percent (Appendix B).

We assume that the dollar value of the impact on compensation persists for the rest of the sample members' working lives. As about half of all new retired-worker Social Security benefits are awarded at age 62 (Steurle and Bakija 1994), and the average age of our research sample members is 22 at the end of the observation period, we assume the impact persists for another 40 years.[9] Our estimates of increased output after the observation period did not change much with small changes in the length of time the earnings impacts are assumed to persist because the impacts occurring late in the sample members' lives are heavily discounted.

C. INCREASED CHILD CARE COSTS

The increase in employment and participation in education and training programs by Job Corps participants is accompanied by an increase in the need for child care provided by persons other than the child's parents. As participants spent more time in education and training and working they had less time to care for their children. Because caring for children is a productive activity, reductions in the amount of child care provided by Job Corps participants should be offset against their increased productivity in paid employment. We measure the decrease in the amount of child care provided by Job Corps participants by the increase in the cost of child care provided by persons other than the child's parents. The increase in child care costs resulting from Job Corps is a cost to society, a cost to participants, and, to the extent that the child care is subsidized, a cost to the rest of society.

Job Corps increased the need for child care provided by someone other than a parent by 135 hours over the four-year observation period (Table III.4). The impact was largest in the first and fourth years, but Job Corps increased the need for child care in each year (Appendix Table A.1). The impacts on child care are small—the total decrease in child care amounts to about four days of child care per year. As, even at the end of the observation period, less than one-third of research sample members had children living with them, and as Job Corps had no significant

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[9] The formula used to estimate the benefits in the post-observation period is described in Appendix C.

TABLE III.4

IMPACTS ON CHILD CARE COSTS

Child Care Provider	Impact (Hours Used in Observation Period)	Social Cost per Hour (1995 Dollars)	Discounted Value of Cost to Society[a] (1995 Dollars)
Unpaid	52.4	$0.00	$0
Paid Relative	45.1	1.55	66
Paid Nonrelative	-8.9	1.86	-16
Day Care Center	38.1	2.39	84
Head Start	1.6	8.66	13
Employer/School	-0.5	2.39	-1
Job Corps	7.5	-[b]	-[b]
Total[c]	135.4	—	$146

SOURCE: Impacts were estimated from baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews. Social costs per hour were obtained from Helburn et al. (1995), Casper (1995), and U.S. Department of Health and Human Services (2001).

NOTE: The impacts by year and their statistical significance are presented in Appendix Table A.1.

[a] The discounted value of the cost to society is equal to the discounted sum of the products of the annual impacts and the social cost and so does not exactly equal the product of the average annual impact and the social cost.

[b] The child care costs incurred by Job Corps are included in our measure of program costs and so are not included here.

[c] Because of rounding, the total may not equal the sum of the rows.

impact on the probability of having a child (Schochet et al. 2001), it is not surprising that the impact is small.

The impacts on the use of different types of child care and the hourly social cost of the child care are presented in Table III.4. The largest impact is on the use of unpaid informal child care, which may be provided by relatives (other than a child's parent). The next largest impacts are on child care provided by paid relatives or by day care centers. The sources of data on the hourly cost of each type of child care are as follows:

- ***Unpaid Care.*** We assume that the providers of unpaid child care do not forgo other employment opportunities. Hence, unpaid care is a cost neither to participants nor to society. Assuming instead that this care costs $1.55 per hour, the average cost of paid care provided by a relative, affects the estimate of the increased cost of child care by only $117 (Appendix B).
- ***Care Provided by Relatives.*** We obtained estimates of the amount spent per hour on child care provided by paid relatives from a study using Survey of Income and Program Participation (SIPP) data from 1993 (Casper 1995).[10] We assume that this cost is borne by the participants.
- ***Care Provided by Nonrelatives.*** We used the estimates from the SIPP of the amount spent on child care provided in family day care settings as the cost of paid care provided by nonrelatives (Casper 1995). We assume that this cost is borne by the participants.
- ***Care Provided in Day Care Centers.*** Estimates of the cost per hour of providing care in day care centers were obtained from a study of 400 day care centers in four states (Helburn et al. 1995). About 13 percent of the cost of day care centers is covered from sources other than fees, most of it from the government (Helburn et al. 1995). Hence, of the $2.39 cost per hour, we assume that parents pay $2.08 and the government (and hence the rest of society) pays 31 cents.
- ***Head Start.*** We used annual expenditures per participant on Head Start (U.S. Department of Health and Human Services 2001) divided by an estimate of the

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[10] Most child care providers other than day care centers receive no government subsidies (Kisker et al. 1991). Hence, it is reasonable to assume that the amount spent on the child care reflects the full economic cost of the child care.

number of hours spent in Head Start, assuming the children participate three hours per day, five days a week, for 39 weeks.[11] This cost is borne by the government.

- ***Care Provided by Employers or Schools.*** We assumed that the cost of child care provided by employers or schools is the same as the cost of care provided in day care centers. We assume that all the cost of the child care provided by schools is borne by the school and that the cost of the child care provided by employers is borne by the participant.[12]

We did not estimate a cost of child care provided by Job Corps, as it is included in our measure of program costs.

The total discounted cost to society of an increase in child care is $146 in the observation period (Table III.4). Participants bear all but $23 of these costs. Just as we expect the impacts on earnings to persist beyond the observation period, we also expect the impacts on child-care costs to persist. However, it would be unrealistic to expect that the impact would persist for the rest of the sample members' working lives, because the need for child care decreases as children get older. Using the 1999 Current Population Surveys (CPS), we estimated that about 49 percent of 22-year-old women without a college degree have children under six. This percentage increases by about 8 percent for each additional year of age until it peaks at 62 percent for 25-year-old women. This percentage then decreases by about 13.5 percent for each additional year of age. We assume that the impacts on child care costs follow a similar pattern: they increase in magnitude by about 8 percent a year for three years after the end of the observation period (when the average age of the sample members is 22). The impacts are then assumed to decline at a rate of 13.5 percent per year. Under these assumptions, the estimated increased cost to society of child care after the observation period is $503, with the participants bearing $398 of the cost and the rest of society bearing the remaining $106.

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[11] The estimated cost includes the cost of other services Head Start may provide, such as nutrition and activities with parents.

[12] Participants may pay employers directly, or indirectly through lower-than-otherwise wages.

D. INCREASED TAXES

The increase in earnings of Job Corps participants is accompanied by an increase in tax payments by participants. We treated this increase in tax payments as a pure transfer. Increased tax payments are a cost to the participants who pay them but a benefit to the taxpayers, and hence to the rest of society.[13]

We measure the impact on four main categories of taxes:

1. ***Federal Income Taxes and Credits.*** Low-income households may be liable for federal income tax but may also receive the Earned Income Tax Credit (EITC) and child credits. In 1999, a single person with no dependents who earned more than $7,050 but less than $25,750 paid 15 percent of income in federal income tax. If income was less than $10,200, the person would also be eligible for an EITC. The credit was equal to 7.65 percent of income up to a maximum credit of $347, and a smaller amount if income was above $5,670. The credit was higher for households with children. A federal child credit of $400 per child was introduced in 1998 and increased to $500 in 1999.
2. ***Payroll Taxes.*** This includes the Social Security tax paid by the employer and employee (each 7.65 percent of earnings up to a maximum). It also includes a federal unemployment tax of 0.8 percent of the first $7,000 of earnings paid to an employee and a state unemployment tax that varies by state, but on average is another 0.8 percent of earnings (U.S. House of Representatives 1998).
3. ***Federal Excise Taxes.*** This includes federal taxes on items such as tobacco and gasoline.
4. ***State and Local Taxes.*** This includes all state and local sales and excise taxes, property taxes, and income taxes net of any state EITC.

We estimated the amount of each tax paid by each member of our research sample in each quarter (Appendix Table A.2). Our estimate of taxes paid was based on income received as either earnings from employers or income from Job Corps. Job Corps pays its students an allowance, bonuses to reward good performance, and post-termination bonuses, all of which are taxable.[14] We estimated the amount of student pay received by each participant by multiplying the average amount of student pay paid per month in Job Corps ($191) and the number of months the participant was in Job Corps. Table III.5 shows the average annual impact on earnings and on earnings plus student pay for each of the four years in the observation period. In each year, the impact on earnings plus student pay is higher than the impact on earnings alone. The largest difference between the two impacts occurs in the first year, when many of the program group members were enrolled in Job Corps.

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[13] Although there are administrative costs and deadweight loss associated with collecting taxes, these are probably small relative to the amount of tax collected.

TABLE III.5

IMPACTS ON TAXES IN THE OBSERVATION PERIOD
(1995 Dollars)

Year After Random Assignment	Impact on Earnings	Impact on Earnings and Student Pay	Impact on Taxes
1	-$1,569	-$526	-$309
2	-13	219	48
3	979	985	376
4	1,221	1,265	518
Discounted Total	**$408**	**$1,720**	**$546**

SOURCE: Baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews.

NOTE: The impacts by quarter and their statistical significance are presented in Appendix Table A.2.

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[14] By not including in our measure of income the receipt of UI benefits, interest income, and other taxable income, we slightly underestimate the amount of tax paid. Most members of our research sample received negligible amounts of these types of income. To the extent that some income may not be reported to the tax authorities, we will overestimate the amount of tax paid.

We calculated the amount of each tax paid as follows:

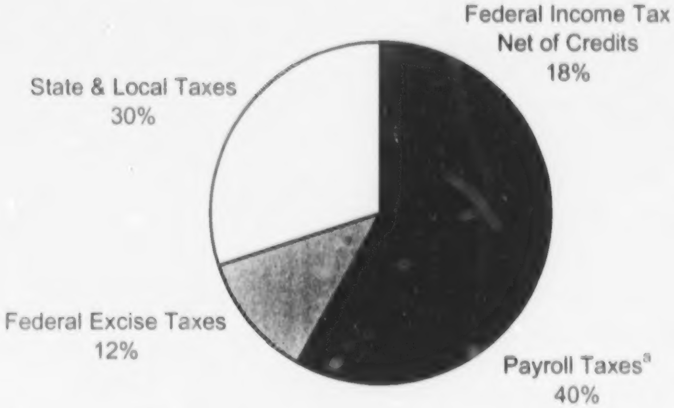
- ***Federal Income Taxes and Credits.*** The federal income tax liability of each sample member was calculated from their household composition, earnings and student pay in a given calendar year, and the tax parameters effective in each year. All persons who were eligible to receive the EITC or child credit were assumed to receive it. (Scholz [1993] estimated that about 86 percent of families eligible for the EITC receive the credit.)
- ***Payroll Taxes.*** We calculated payroll taxes by applying the appropriate tax rate to earnings plus student pay.
- ***Federal Excise Taxes.*** We simulated the amount each sample member paid in federal excise taxes from their household income and composition, using estimates of the amount of federal excise taxes paid as a percentage of income for households with income of less than $10,000, calculated by the U.S. Congressional Budget Office (CBO) (1998). The CBO estimated that a single-person household was expected to spend 5.1 percent of its income on federal excise taxes.
- ***State and Local Taxes.*** We assumed that all sample members paid 12.4 percent of earnings and student pay on state and local taxes. This estimate of the taxes paid by low-income households (those with income under $25,700) comes from a 1995 nationwide study of state and local taxes (Ettlinger et al. 1996).

The average impacts of Job Corps on total tax payments during each year of the observation period are presented in the last column of Table III.5. The impact was negative in the first year when the impact on earnings was negative. The impact on taxes became positive in the second year, even though the impact on earnings was negative, because the impact on earnings and student pay was positive. By the fourth year of the observation period, the impact on taxes was $518—an increase in taxes paid of about 15 percent. Even though in this year about 36 percent of earnings and student pay was spent on taxes, because the tax *rate* increases with income, the tax impact was about 41 percent of the impact on earnings and student pay.

Figure III.2 depicts the composition of the impact on taxes in the fourth year by type of tax paid. Payroll taxes accounted for the largest share, 40 percent, of the total impact, and federal income taxes (net of credits) accounted for 18 percent. Even though the average rate of federal

FIGURE III.2

COMPOSITION OF THE IMPACT ON TAXES IN THE FOURTH YEAR OF THE OBSERVATION PERIOD



[a] Including state UI taxes

income tax is low for low-income persons, tax paid on additional income (the marginal tax rate) is high, because as income increases, the EITC is phased out and a higher tax rate applies.

We extrapolated the impact on taxes after the observation period in the same way we extrapolated compensation. We assume that the dollar impact on taxes in the fourth year of the observation period persists for the remainder of the sample member's working life. Under this assumption, the impact on total taxes paid after the observation period was $9,115.

E. OUTPUT PRODUCED DURING VOCATIONAL TRAINING

An important part of vocational training in Job Corps is the hands-on experience gained on projects that involve producing a finished product or service. While the main purpose of these projects is to train youth, the products and services produced during the training are valuable by-products. The value of the training aspect of the project is captured by the impact of Job Corps on earnings. For completeness, we also include an estimate of the value of the output of the projects in our estimates of the benefits from Job Corps.

Depending on the trade, vocational training may involve one of two types of projects:

- ***Vocational Skills Training (VST) Projects.*** VST projects involve repair and maintenance of facilities or remodeling and construction work by students in the construction trades. While most VST projects take place on the buildings and grounds of Job Corps centers, some take place in the community.
- ***Work Experience (WE) Projects.*** After mastering a skill level, students in service-oriented trades work without pay in real-work settings. While some of these WE projects take place on center, they are usually located at public or private organizations in the community.

We included in the benefit-cost analysis only the value of the output or service produced while students conduct VST or WE projects *in the community*. We did not include the value of the projects that are conducted on the buildings or grounds of Job Corps centers. This is because projects conducted at the center reduce either the operating costs of the program or the capital costs of renovating the center. As the value of these on-center projects is captured in lower-than-otherwise operating or renovating costs, including their value again as a benefit would double count the benefits.[15]

We estimated the value of the output of these projects by collecting data on the amount of time students spent on the projects in 23 randomly selected centers and conducting in-depth studies of 44 projects that were taking place at them.[16] We valued the goods or services produced by using the cost of obtaining the good or service from an alternative supplier. For most of the VST projects, we asked a knowledgeable person, usually a professional contractor, how much they would charge to produce the same output as the students. For the WE projects and some of the VST projects, we estimated the cost of hiring someone else to do the work that the students performed.

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[15] In an earlier report on the value of the output of VST and WE projects (McConnell 1999), we had proposed including the value of those on-center projects that lead to lasting improvements. However, we rejected this approach after deciding to include the costs of rehabilitating and renovating the centers as a measure of the cost of the capital embodied in Job Corps. The projects that lead to lasting improvements reduce the cost of renovating and rehabilitating the centers.

The main findings of our study of these work projects are presented in Table III.6. While on average students spent about 31 (six-hour) days on VST or WE projects each year they were at Job Corps (not shown), they spent only 8 days (27 percent) on projects in the community. They produced output worth $6.50 each hour they spent on the projects. We estimate that on average each student produced output worth about $225 per participant while they were enrolled in Job Corps. This output is a benefit to society as a whole and to the community (the rest of society). Participants benefit only from the training value of the projects.

TABLE III.6

ESTIMATES OF THE VALUE PRODUCED BY JOB CORPS STUDENTS
DURING VST AND WE PROJECTS IN THE COMMUNITY
(1995 Dollars)

		Value of Output	
Type of Community Project	Number of Days Spent on Projects per Participant-Year	Per Hour Spent on Project	Per Participant
Work Experience	5.5	$7.01	$167
Vocational Skills Training	2.9	$5.49	$58
Total	**8.4**	**$6.50**	**$225**

SOURCE: McConnell (1999)

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[16] McConnell (1999) describes the estimation of the value of the output from these projects in detail.

F. SUMMARY

The value of the increased output of Job Corps participants from each perspective—society, participants, and the rest of society—is presented in Table III.7. All the benefits that accrue after the first year are discounted. We present the benefits for the first year of the observation period separately from those of the other years. As most of the participants were enrolled in Job Corps in the first year, years 2, 3 and 4 of the observation period can be thought of as the postprogram period.

Society benefits from an increase in output of $27,531 per participant. Participants also benefit from the increase in earnings and fringe benefits of $17,773 per participant (after additional taxes and child care costs are subtracted). The rest of society also benefits from the increased output—taxpayers and the government benefit from the increase in taxes, and the local community benefits from VST and WE projects conducted during vocational training. After the additional child care costs paid for by the government are subtracted, the rest of society benefits from an increased output of $9,758 per Job Corps participant.

Under our assumptions, this benefit is spread throughout the participants' working lives. In the last three years of the observation period, when many of the program group members had left Job Corps, the increase in output was about $2,600 per participant. The increase in output that we expect to occur after the study observation period is more than 10 times this figure. And because we do not observe this increase in output, there is more uncertainty about its size. However, as discussed in Chapter VII and Appendix B, under a wide range of assumptions, this output is large enough for the benefits from Job Corps to exceed its costs.

TABLE III.7

BENEFITS FROM INCREASED OUTPUT
(1995 Dollars)

Benefit	Perspective		
	Society	Participants	Rest of Society
Year 1			
Increased Earnings and Fringe Benefits	-$1,883	-$1,883	0
Increased Child Care Costs	-50	-47	-4
Increased Taxes	0	309	-309
Years 2 to 4			
Increased Earnings and Fringe Benefits	2,558	2,558	0
Increased Child Care Costs	-96	-77	-19
Increased Taxes	0	-855	855
After the Observation Period			
Increased Earnings and Fringe Benefits	27,281	27,281	0
Increased Child Care Costs	-503	-398	-106
Increased Taxes	0	-9,115	9,115
Output Produced During Vocational Training in Job Corps	225	0	225
Total[a]	$27,531	$17,773	$9,758

SOURCE: Tables III.1, III.4, and III.5.

[a] Because of rounding, total may not equal sum of rows. Similarly, benefits to society may not equal the sum of the benefits to participants and the rest of society.

IV. BENEFITS FROM REDUCED USE OF PROGRAMS AND SERVICES OTHER THAN JOB CORPS

Participation in Job Corps reduced the use of a wide variety of other programs and services, including those involving education and training, public assistance, and substance abuse treatment (Schochet et al. 2001). Because these programs and services are expensive, reducing their use benefits society. Further, because the government usually pays for them, their reduced use also benefits the rest of society.

This chapter presents our estimates of the benefit from the reduced use of other programs and services by Job Corps participants. We estimate the benefit to society to be just under $2,200 per participant, mostly from the reduced use of education and training programs other than Job Corps. More than half (about $1,200) is due to the reduction in attendance at high school, and about $900 is a result of a reduction in use of other education and training programs. As public assistance is mainly a transfer program, its reduced use benefits society by only about $100 per participant. The benefit to society from the small reduction in the use of substance abuse treatment programs is only $24 per participant.

The rest of the chapter is organized as follows. Section A presents our estimates of the benefits from the reduced use of education and training programs other than Job Corps. Sections B and C present our estimates of the benefits from the reduced use of public assistance programs and from the reduced use of substance abuse treatment programs. We conclude in Section D with a summary of the estimated benefits.

A. REDUCED USE OF OTHER EDUCATION AND TRAINING PROGRAMS

When denied entry into Job Corps, many control group members enrolled in alternative education and training programs. Their use of these programs show that youth would participate in other education and training programs if Job Corps was not available. As Job Corps provides intensive education and training, it is not surprising that we find that Job Corps participants to be less likely to use other education and training programs. As these programs are costly to the government and hence society, a reduction in their use is a societal benefit.[1]

1. Impacts on the Use of Other Education and Training Programs

We estimated the impacts of Job Corps on the use of education and training programs by comparing the program and control groups' use of these programs. We present estimates of the impacts on attendance in these other programs over the four-year observation period, by type of program, in Table IV.1. Participation in Job Corps reduced the use of other education and training programs by 341 hours over the four-year observation period. It significantly reduced attendance at high school; two-year colleges; GED programs; vocational, technical, and trade schools; Adult Basic Education (ABE) programs; and English-as-a-Second Language (ESL) programs. Job Corps had no significant impact on attendance either at four-year colleges or at programs we had to categorize as "other" because we lacked sufficient information about them.

Impacts were largest for those programs that could be considered close substitutes for Job Corps, high school being the most frequently used alternative. Job Corps reduced attendance at high school by 194 hours, or about six and a half weeks per participant. Job Corps reduced

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[1] Instead of including the reduction in use of these other programs as a benefit, we could have considered the "cost" of Job Corps to be the amount by which its operating cost exceeds the cost of the alternative education programs. Our estimate of the net benefits of Job Corps is not affected by whether we include the reduction in the use of these other programs as a benefit or as an offset against program costs.

TABLE IV.1

BENEFITS FROM REDUCED ATTENDANCE AT OTHER EDUCATION OR TRAINING PROGRAMS

Program	Impact on Hours/Weeks Attended[a]	Social Cost (1995 Dollars)	Discounted Benefit to Society[b] (1995 Dollars)
High School	-194 hours***	$6.41 per hour[c]	$1,189
General Education Development (GED)	-55 hours***	5.47 per hour	296
Vocational, Technical, or Trade School	-37 hours***	7.60 per hour	271
Adult Basic Education (ABE)	-12 hours***	6.53 per hour	76
English as a Second Language (ESL)	-4 hours**	4.57 per hour	17
Two-Year College	-1 week**	181.00 per week	253
Four-Year College	0.1 week	520.00 per week	-60
Other	-4 hours	6.10 per hour[c]	23
Total[d]	-341 hours	-	$2,064

SOURCE: Impacts are estimated from baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews. Social costs were obtained from NCES (2000), Young et al. (1994), and data from the *National JTPA Study*.

[a] The impacts on the attendance at high school, GED, vocational training, ABE, and ESL programs are spread across each of the four observation years as follows: 58.5 percent of each impact occurs in year 1, 30.4 percent occurs in year 2, 8.6 percent occurs in year 3, and 2.5 percent occurs in year 4. The impact on the attendance at vocational training programs, two-year colleges, and "other" programs are spread across the four observation years as follows: 60.7 percent of each impact occurs in year 1, 17.9 percent occurs in year 2, 3.6 percent occurs in year 3, and 17.9 percent occurs in year 4. The impact on attendance at four-year colleges is assumed to occur only in year 4.

[b] The discounted benefit is equal to the sum of the benefit in each year. As the benefits in years 2, 3, and 4 are discounted, this is not identical to the total impact times the social cost of the program.

[c] A different hourly cost is used each year. The average hourly cost is presented in this table.

[d] Because of rounding, the total may not equal the sum of the numbers in the rows.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

attendance at GED programs by 55 hours per participant; at vocational, technical, and trade schools by 37 hours; and at two-year colleges by one week.[2]

The time profile of impacts is important for purposes of discounting the costs correctly and for deciding whether it is appropriate to extrapolate the impacts beyond the observation period. Table IV.2 shows the annual impacts on attendance at all high school, GED, ABE, and ESL programs and all vocational, technical, and trade schools; two-year colleges; and "other" programs. Impacts were largest in the first year after random assignment, when many program group members were enrolled in Job Corps and control group members were enrolled in other programs, and decreased sharply in later years as program group members left Job Corps and some enrolled in other programs. Although some impacts persisted in the last year of the observation period, they were small and not statistically significant. Hence, any benefits from a reduction that would occur in the use of other education and training programs after the observation period would be small.

To increase the precision of our estimates, we estimated the impacts on the use of other education and training programs over the whole four-year observation period. However, in order to discount benefits in years 2 to 4, we needed estimates of the impacts of attendance in each program for each year of the observation period. These were obtained by assuming that the impacts of Job Corps on the use of each of four programs—high school, GED programs, ABE programs, and ESL programs—were distributed across the four years of the observation period in the same way as the total impacts on the use of all four programs together: 59 percent in year

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[2] We estimated costs of two- and four-year college in terms of weeks rather than hours, because respondents to our survey were probably more accurate in reporting weeks rather than hours in college and we do not expect the hours per week to vary much between college programs. We measured attendance in the other programs in hours because there is a wide variation in the number of hours per week people attend these programs.

TABLE IV.2

IMPACTS ON ATTENDANCE AT OTHER EDUCATION OR TRAINING PROGRAMS, BY YEAR

	Impact on Attendance at Education and Training Programs	
Year After Random Assignment	Hours in High School, GED, ABE, and ESL Programs (Hours)	Vocational, Technical, and Trade Schools, Two-Year Colleges, and Other Programs (Weeks)
1	-159***	-1.3***
2	-83***	-0.4*
3	-23***	-0.1
4	-7	-0.4

SOURCE: Baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

1, 30 percent in year 2, 9 percent in year 3, and 2 percent in year 4. Similarly, we assume that the impacts on the use of vocational training, two-year college, and other programs were distributed across the four years of the observation period in the same way as the impacts on the use of all three types of programs together: 61 percent in year 1, 18 percent in year 2, 4 percent in year 3, and 18 percent in year 4. We assume that the small impact on attendance at four-year colleges occurs only in year 4.

2. Costs of Attending Other Education and Training Programs

We used published sources (Table IV.1) to estimate the social cost per hour (or week) of attending education or training programs. For consistency with our approach to estimating the cost of Job Corps, we attempted to be as comprehensive as possible in measuring the costs of other programs. Because of data availability, we used the average rather than the marginal costs of the programs. This is consistent with estimating the average cost of Job Corps (Chapter VI).

a. High School

We estimated that on average during the study observation period, high school cost about $7,600 per student school year, or just under $6.50 per student-hour. This estimate was based on data on annual expenditures on public elementary and secondary schools collected by the U.S. Department of Education's National Center for Education Statistics (NCES) (U.S. Department of Education 2000). We estimated the cost for each year in the observation period using annual data for the school year that most closely corresponds to the year in the observation period.[3]

We base our estimate of the cost of high school on current operating expenditures plus 50 percent of capital expenditures on public elementary and secondary schools. For consistency with our treatment of capital in Job Corps (see Chapter VI), we would like to include only the capital expenditures for replacing depreciated school buildings and not expenditures for expanding the school system. We assume, admittedly arbitrarily, that half the school's capital expenditures, which are about 7 percent of current expenditures, are used to renovate and rehabilitate existing structures. Removing or including all capital expenditures from our estimate of the cost of high school affects the estimate of the benefits from Job Corps by only about $100 (Appendix B).

To obtain an estimate of the annual cost *per student per hour*, we divided annual expenditures on schools by the number of students enrolled in school in the fall semester, an estimate of the number of weekdays between the beginning and end of the school year (199 days),[4] and an estimate of the length of each school day (6 hours). Because the follow-up interviews asked for the beginning and ending dates of attendance at an education or training program and the *usual* hours in attendance, our estimates of the impacts on attendance at these programs included occasional days absent, breaks, and holidays. Hence, for consistency with our impact estimates, we estimated our measure of the cost of high school using the number of enrolled students rather than the number of students in attendance, and the number of weekdays between the beginning and end of the school year rather than the number of days that school is in session.

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[3] We used school years 1995-1996, 1996-1997, 1997-1998, and 1998-1999 for years 1, 2, 3 and 4, respectively.

[4] U.S. Department of Education (2000) estimates that, on average, school is in session for 179 days. We estimated the number of weekdays between the beginning and end of the school year by adding 20 more days: 7 for holidays and 13 for winter and spring breaks.

The NCES data have three advantages over other available data on school costs. First, they are national, while other studies use data for specific states only.[5] This is important, because expenditures on education vary considerably by state. For example, in school year 1995-1996, current expenditures per student in fall enrollment varied from $3,604 in Utah to $9,361 in New Jersey (U.S. Department of Education 2000). Second, they include costs incurred by the school districts' central administrative offices, which comprise about 12 percent of all school costs (U.S. Department of Commerce 1993).[6] Third, while most other estimates of school costs are based on one year only, NCES provides expenditure data by year, a key consideration given the rapid increase in education costs.[7]

The NCES data do, however, have two significant drawbacks, both of which suggest that they underestimate the costs of high school for members of our sample. First, NCES does not provide expenditure data for secondary and elementary schools separately, though studies have found that cost per student in high schools, largely because of their higher student-teacher ratios, is greater than in other schools (Picus 1993). The U.S. Department of Commerce (1993) found that the average per student cost of high school is about 23 percent higher than the average per student cost of all schools, so we estimated the cost of high school by multiplying NCES's reported per student expenditures on all schools by 1.23. Adjusting the NCES data in this way increases our estimate of the benefits of Job Corps by about $200 per participant (Appendix B).

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[5] For example, Sherman et al. (1996) estimates school costs only in Texas and Ohio. Krop et al. (1995) examine school costs only in California.

[6] Sherman et al. (1996) and Rosenberg and Hershey (1995) do not include the costs of the central administrative offices.

[7] Estimated expenditures on schools for the school year 1998-1999 are 7 percent higher than expenditures for the school year 1995-96 (U.S. Department of Education 2000).

The second drawback of the NCES data for our analysis is that it is an average cost over *all* students. However, members of our research sample are more likely to attend dropout prevention and recovery programs, alternative schools, special education programs, and schools that receive federal Title I education funds. All these special programs and schools are more costly than the average school program.[8] In Appendix B, we show that even if it cost 25 percent more for a member of our sample to attend high school, net benefits would increase by only $300 per participant.

b. Education and Training Programs Other than High School

The costs of education and training programs other than four-year colleges fall between $4.50 and $7.60 per student-hour, averaging just over $6.00 (Table IV.1). The sources of our estimates of these costs are described below:

- ***GED, ABE, and ESL Programs.*** Data on the costs of these programs were obtained from the U.S. Department of Education's 1990-1994 *National Evaluation of Adult Education Programs* (Young et al. 1994). These cost data were collected from a survey of 128 programs and detailed case studies of 12 programs. The study found that, on average, GED programs cost $5.47 (in 1995 dollars) per student-hour, ABE programs $6.53, and ESL programs $4.57. These estimates include in-kind costs, such as donated classroom space.

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[8] Rosenberg and Hershey (1995) found that expenditures per student participating in the School Dropout Demonstration Assistance Program were about one-third higher than expenditures on the schools that students would have attended in the absence of the dropout program.

- ***Vocational, Technical, and Trade Schools.*** Our estimate of the hourly cost of attendance at vocational, technical, and trade schools is based on the average cost at 84 public, private for-profit, and private nonprofit schools attended by sample members in the *National JTPA Study* (Orr et al. 1996). A telephone survey collected data on tuition and attendance from these schools. The average cost (in 1995 dollars) was $7.60 per hour.[9]

- ***Two- and Four-Year Colleges.*** Our estimates of the cost of college are based on the annual expenditures per full-time-equivalent student in two- and four-year public institutions of higher education (U.S. Department of Education 2000). We converted these annual costs to weekly costs by dividing by 39 weeks.

- ***Other.*** For the cost of the "other" programs, we averaged the hourly cost of all the types of education and training programs (other than four-year colleges) listed in Table IV.1.

3. Benefits from the Reduced Use of Other Education and Training Programs

The reduction in attendance at education and training programs other than Job Corps saved society about $2,100 per participant (Table IV.1). Figure IV.1 illustrates the relative importance of the reduction in attendance at each type of program. As the costs of the different programs are so similar, the differences in the size of the benefits between the types of programs reflect mostly differences in the size of the impacts.

High school alone accounts for 56 percent of the total benefit from the reduction in the use of other education and training programs. Together, GED programs and vocational, technical, and trade schools account for 29 percent of the benefit.

The reduction in the use of other education and training programs is a benefit to society, but as members of our research sample are unlikely to bear the cost of attending these programs, the

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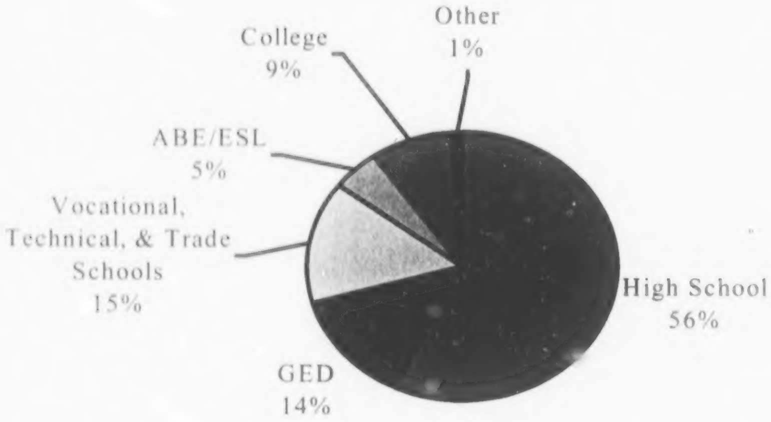
[9] Michelle Wood at Abt Associates Inc. graciously provided these data.

FIGURE IV.1

COMPOSITION OF THE BENEFITS FROM THE REDUCED USE OF EDUCATION AND TRAINING PROGRAMS



government (and hence the rest of society) also benefits from the reduction in their use. Most of these programs are financed by a combination of federal, state, and local government funds.[10]

B. REDUCED USE OF PUBLIC ASSISTANCE

Job Corps reduced the use of public assistance by a small but significant amount. While enrolled in Job Corps, students have less need for public assistance, because Job Corps provides most of their day-to-day needs. Once Job Corps participants leave the program, their higher earnings may reduce their need for assistance.

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[10] About 48 percent of the funds for schools are financed by the state, 43 percent by the local government, 7 percent by the federal government, and the rest from other sources (U.S. Department of Education 2000). Young et al. (1994) estimate that 55 percent of the cost of GED, ABE, and ESL programs is financed by state funds, 31 percent is financed by federal funds, and the rest is financed from local government funds and other sources.

Public assistance comprises mainly transfers from the government to those in need. Hence, most of the reduction in public assistance represents a benefit to the government but an equal cost to participants. Society, however, does benefit from the reduction in public assistance, because of savings in the costs of administering the assistance, such as the costs of determining and monitoring eligibility for assistance and of providing any counseling, job search assistance, and supportive services that may be involved. The savings in administrative costs are a benefit to the government (the rest of society) and to society as a whole.

1. Impacts on the Use of Public Assistance

We estimated the impact on the receipt of seven types of public assistance:

1. Aid to Families with Dependent Children (AFDC) and Temporary Assistance for Needy Families (TANF), which replaced AFDC under welfare reform
2. Food stamp benefits
3. Supplemental Security Income (SSI) or Social Security Retirement, Disability, and Survivor's Benefits (SSA)
4. General Assistance (GA)
5. Unemployment Insurance (UI)[11]
6. Medicaid or other public health insurance programs
7. Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)

The impacts on the receipt of benefits from each of these programs are presented in Table IV.3. Most impacts are small and not statistically significant. Indeed, only the impacts on the receipt of SSI or SSA benefits and UI benefits are statistically significant. Job Corps has the

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[11] UI benefits are public insurance rather than assistance. However, we discuss UI benefits in this section because the treatment of insurance and assistance programs within our benefit-cost framework would be identical.

TABLE IV.3

BENEFITS FROM THE REDUCED USE OF PUBLIC ASSISTANCE

Type of Assistance	Total Undiscounted Impact on Benefits Received	Total Discounted Value of Reduced Benefits (1995 Dollars)	Administrative Cost as a Percentage of Benefit Received	Discounted Benefit to Society (1995 Dollars)
AFDC/TANF	-$171	-$156	16%	$25
Food Stamps	-102	-94	16	15
SSI/SSA	-315***	-288	7	20
GA	-36*	-33	16	5
UI	-50***	-46	16	7
Medicaid or Other Public Health Insurance	-[a]	-166[b]	16	27
WIC	0.1 months[c]	3[d]	-[e]	-1
Total	-	-$780	-	$98

SOURCE: Impacts are from Schochet et al. (2001) Tables VII.2, VII.3, VII.4, E.1, and VII.5. Administrative costs were obtained from U.S. House of Representatives (1998).

[a] We estimated the impact on the percentage of people receiving the benefit. The estimated impact was -1.5 percent at the 12-month follow-up interview, -1.2 percent at the 30-month follow-up interview, and -1.5 percent at the 48-month follow-up interview. We assumed that the impact was -1.5 percent in year 1, -1.2 percent in years 2, and 3, and -1.5 percent in year 4.

[b] The impact on Medicaid or other public health insurance benefits was estimated from the product of the impacts on the probability of being covered by a public health insurance program and $3,311, the average annual per person outlay on Medicaid benefits.

[c] We estimated the impact on months WIC benefits were received. The estimated impact was 0.1 months.

[d] The impact on WIC benefits was calculated from the product of the impact on the number of months of receipt of WIC benefits and by $31, the average cost of a WIC food package.

[e] The administrative cost is $11 per month.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

largest impact on the receipt of SSI and SSA benefits, but the reduction was only about $300 over the four-year observation period.

To determine how to allocate impacts by year for purposes of discounting, and to assess the need to extrapolate beyond the observation period, we examined impacts on the total receipt of AFDC/TANF, food stamps, SSI, SSA, and GA by year (Table IV.4). The impact of Job Corps on the receipt of public assistance was largest in years 1 and 2 of the observation period, and declined in years 3 and 4. While the impacts in each year are significantly different from zero, the impact in year 4 is only about two-thirds the size of the impact in year 2. Similar patterns of decay were observed for the separate impacts on the receipt of AFDC or TANF, food stamps, and SSI and SSA benefits.

TABLE IV.4

IMPACTS ON THE RECEIPT OF AFDC/TANF, FOOD STAMPS,
SSI/SSA, OR GENERAL ASSISTANCE, BY YEAR
(1995 Dollars)

Year After Random Assignment	Average Amount of Benefits Received in Year
1	-$161**
2	-171***
3	-150***
4	-111**

SOURCE: Schochet et al. (2001) Table VII.1.

* Significantly different from zero at the .10 level, two-tailed test.
** Significantly different from zero at the .05 level, two-tailed test.
*** Significantly different from zero at the .01 level, two-tailed test.

As with alternative education and training programs, we used the time profile of impacts on the receipt of total public assistance shown in Table IV.4 to allocate the impacts for each individual program to years within the observation period. The impacts on the use of each type of public assistance across each year were distributed as follows: 27 percent in year 1, 29 percent in year 2, 25 percent in year 3, and 19 percent in year 4.

Because the impacts decline during the observation period, we did not include in our benchmark estimates an estimate of the benefits from a reduction in public assistance after the observation period. However, as the impact on the amount of public assistance received was still positive and statistically significant in year 4, we examined the sensitivity of our estimate to this assumption (Appendix B). If the reductions in the receipt of public assistance persist after the observation period but decay at the rate observed during the last three years of the observation period (about 20 percent), the total benefit from the reduced use of other programs and services would increase by less than $60. However, the total benefits to the government (the rest of society) would increase by more than $500, and the cost to participants would fall by just less than $500.

2. Costs of Public Assistance

The cost to the government of providing public assistance consists of two components: (1) the cost of the program's benefits paid to recipients (the transfer), and (2) the cost of administering the benefit. For all types of public assistance, except public health insurance and WIC, we measured the impact on the amount of assistance received directly. We estimated the reduction in average public health insurance benefits by multiplying the impact on the probability of being covered by the insurance by $3,331, the average per-person Medicaid payment in fiscal year 1995 (U.S. House of Representatives 1998). We estimated the reduction in WIC benefits by multiplying the impact on the months of WIC receipt by $31, the average monthly cost of a WIC food package in fiscal year 1996 (U.S. House of Representatives 1998). Table IV.3 presents the total discounted reduction in the receipt of benefits during the four-year observation period.

We assumed that administration costs are a fixed percentage of the value of the benefits and estimated the administrative costs of providing each type of assistance from the average, over fiscal years 1995 and 1996, of total administrative costs as a percentage of total benefits.[12] For all programs other than SSI/SSA, administrative costs are about 16 percent of total benefits. The average national cost of administering and providing nutrition counseling to WIC participants, $11 per month per participant, was used as the cost of administering WIC (U.S. House of Representatives 1998).

3. Benefits from the Reduced Use of Public Assistance

The benefit to society as a whole from the reduction in the use of public assistance is just under $100, the reduction in the cost of administering these programs (Table IV.3). However, the government and the rest of society benefit from both this $100 reduction in administrative costs and the nearly $800 reduction in the value of public assistance benefits. This reduction in public assistance benefits is a cost to Job Corps participants who do not receive the transfers.

C. REDUCED USE OF SUBSTANCE ABUSE TREATMENT PROGRAMS

Substance abuse treatment programs are typically very costly. Hence, even a modest reduction in their use could yield a sizable benefit to society. However, Job Corps participation reduced the likelihood that a youth would use a substance abuse treatment program (outside Job Corps) by only about 0.5 percentage points, and this impact is not statistically significant (Schochet et al. 2001). Table IV.5 shows the impacts on the probability of receiving substance

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[12] These data were obtained from U.S. House of Representatives (1998). We assumed that the cost of administering GA and Medicaid was the same as the cost of administering AFDC/TANF and food stamps.

TABLE IV.5

BENEFITS FROM A REDUCTION IN THE USE OF SUBSTANCE ABUSE TREATMENT PROGRAMS

Place of Treatment	Impact on Percentage Receiving Treatment at Each Place	Cost Per Person (1995 Dollars)	Discounted Benefit from Reduction in Use (1995 Dollars)
Hospital	-0.1	$5,866	$8
Freestanding Detoxification Center	0.2	1,187	-3
Short-Term Residential Center	-0.4	3,895	18
Long-Term Residential Center	-0.2	5,077	10
Outpatient	-0.1	1,161	2
Other	0.3	3,609	-12
Total[a]	-	-	$24

SOURCE: Schochet et al. (2001) Table VII.14.

[a] Because of rounding, the total may not equal the sum of the rows.

abuse treatment, by place of treatment. The costs per person of receiving treatment at each place vary considerably, from just over $1,000 per participant in an outpatient setting or freestanding detoxification center to nearly $6,000 in a hospital (Harwood et al. 1998). However, because the impacts of Job Corps on the use of these programs are so small, they produced a benefit to society of only $24 per participant over the four-year observation period. We assume that participants do not pay for their treatment and so the rest of society, primarily the government, also benefits by $24 per participant.

D. SUMMARY

Society benefits from the reduced use of other programs and services by $2,186 per participant (Table IV.6). About 54 percent of this benefit is a result of the reduction in attendance at high school, about 40 percent is a result of the reduction in the use of education and training programs other than high school, 4 percent is due to the reduction in the use of public

TABLE IV.6

BENEFITS FROM THE REDUCED USE OF OTHER PROGRAMS AND SERVICES
(1995 Dollars)

	Perspective		
Program/Service	Society	Participants	Rest of Society
High School	$1,189	0	$1,189
Other Education and Training Programs	874	0	874
Public Assistance	98	-780	879
Substance Abuse Treatment Programs	24	0	24
Total[a]	$2,186	-$780	$2,966

SOURCE: Tables IV.1, IV.3 and IV.5

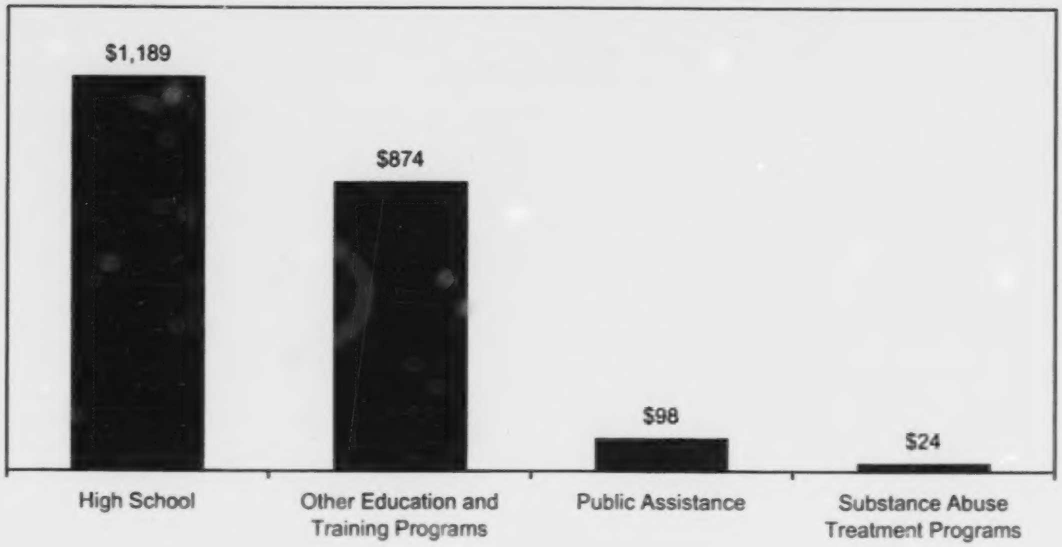
[a]Because of rounding, the total may not equal the sum of the rows.

assistance, and the rest is due to the reduction in the use of substance abuse treatment programs (Figure IV.2). Job Corps participants lose $780 on average because of the loss of public assistance benefits. The rest of society benefits from the reduction in the use of other programs and services by $2,966 per participant. Just over one-third of this benefit is from the reduction in attendance at high school, and the rest is evenly divided between the reduction in the use of other education and training programs and the reduction in the receipt of public assistance.

These findings hold even with changes in key assumptions. Using plausible alternatives to our benchmark assumptions, we obtain estimates that vary from our benchmark estimate of $2,186 by less than $300. This range of difference is small compared to the costs of the program and the benefits of increased output.

FIGURE IV.2

BENEFITS TO SOCIETY FROM THE REDUCED USE OF OTHER PROGRAMS AND SERVICES, BY TYPE OF PROGRAM OR SERVICE
(1995 Dollars)



V. BENEFITS FROM REDUCED CRIME

Job Corps participation leads to significant reductions in crime by youth while they are enrolled in the program, and to smaller reductions after they leave (Schochet et al. 2001). Students commit less crime while they are enrolled because they are constantly supervised at centers and have few opportunities to get into trouble with the law. After the students leave Job Corps, new skills and opportunities divert them from criminal activity. These reductions in participants' criminal activity represent important benefits to society.

Along with these reductions in crime committed by Job Corps participants, there are benefits to participants from reductions in crime committed *against* them. For example, participants who move from a dangerous neighborhood to a protected and supervised Job Corps center may reduce their exposure to gang violence, burglary, motor vehicle theft, and other crimes. Changes in lifestyle and opportunities induced by Job Corps, such as residential location and the time spent employed, could result in less victimization of participants even after they leave Job Corps. These reductions in crime against participants represent important benefits to the participants themselves, although as we discuss below, they may not reduce crime overall in society.

This chapter presents estimates of the dollar value of these reductions in crime by and against participants, including the reduction in criminal justice system (CJS) processing costs and in the costs to crime victims. We estimated the measurable value of these benefits to society to be $1,240 per participant. We estimated the benefits to the participants from the reduction in crime against them to be $643 per participant.

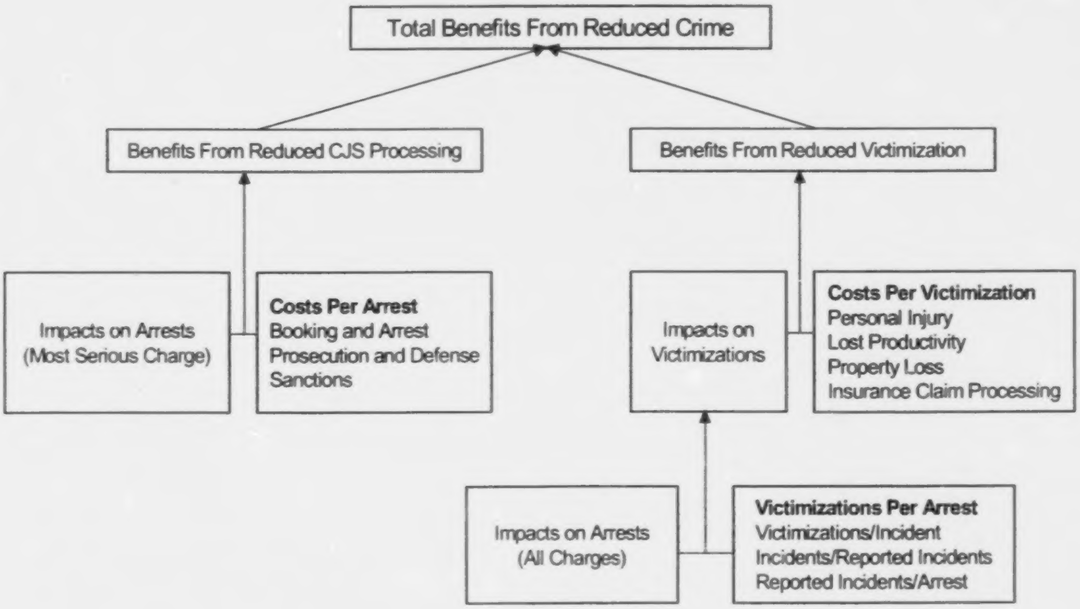
The rest of the chapter is organized as follows. Section A discusses our basic approach to appraising the benefits of crime reduction. Sections B and C present estimates of the value of reduced CJS processing costs and of reduced costs to victims per Job Corps participant, respectively. Finally, Section D summarizes the net benefits of Job Corps' impacts on criminal activity and discusses the sensitivity of the results to key assumptions.

A. FRAMEWORK

The framework for valuing the benefits to society of reduced crime by Job Corps participants is shown in Figure V.1 and discussed in the next three subsections. Valuing the benefits to participants of reduced crime against them raises special issues which we discuss in Section A.4.

FIGURE V.1

COMPONENTS OF BENEFITS FROM REDUCED CRIME


Total Benefits From Reduced Crime
Benefits From Reduced CJS Processing
Benefits From Reduced Victimization
Impacts on Arrests (Most Serious Charge)
Costs Per Arrest
Booking and Arrest
Prosecution and Defense
Sanctions
Impacts on Victimizations
Costs Per Victimization
Personal Injury
Lost Productivity
Property Loss
Insurance Claim Processing
Impacts on Arrests (All Charges)
Victimizations Per Arrest
Victimizations/Incident
Incidents/Reported Incidents
Reported Incidents/Arrest

1. Two Sources of Benefits

Reductions in crime benefit society in two principal ways. First, they reduce the need to find, capture, prosecute, and punish offenders. We refer to this benefit as *reduced CJS processing*. Second, they benefit society by reducing the costs to victims of crime. We refer to this benefit as *reduced victimization*. Figure V.1 shows how the components are calculated. The total benefit from reduced crime is the sum of the benefits from reduced CJS processing and from reduced victimization. We estimated the size of each of these benefits by multiplying the impact on the number of arrests (or victimizations) by a corresponding estimate of the costs per arrest (or victimization). In Figure V.1, the measures listed in the boxes connected by horizontal lines are multiplied together and added to the subtotals, as indicated by upward-pointing arrows.

Following this approach, we estimated impacts and costs for each of 11 categories of crime. We calculated the social costs per arrest or per victimization for each crime type from estimates in published secondary sources. The details are discussed further below and in Appendix F. To summarize, the cost of CJS processing includes:

- Booking and arrest
- Prosecution and defense
- Sanctions

Victim costs include:

- Personal injury
- Lost productivity
- Property losses
- Administrative costs of processing insurance claims for the above losses

2. Crime Types

The unit cost of each crime differs depending on the seriousness and nature of the crime itself. Therefore, the benefit calculations are based on impacts and unit costs estimated separately for different types of criminal offense. The National Job Corps Study tracked 41 separate criminal offenses, which match closely those defined in the National Incident-Based Reporting System of the U.S. Department of Justice, Bureau of Justice Statistics. We then combined offenses with the same estimated social cost into 11 categories for ease of presentation. The allocation of the 41 crime types into 11 categories, presented in sections B and C, differs for the analysis of CJS processing and victimization because the costs by type of crime differed.

3. Timing of Benefits

Impacts of Job Corps on arrests were largest in the first year after random assignment, when most program group members were participating in Job Corps. To discount the benefits from a reduction in crime in years 2 through 4, we estimated separate impacts by year. Because estimating separate impacts for each of the 41 offenses in every year would be very imprecise, we estimated impacts over the entire four-year period by crime type. We then estimated the impact on the number of arrests of all crime types separately by year. We found that 62 percent of the impact on arrests occurred in the first year after random assignment, 16 percent occurred in the second year, 6 percent in the third year, and 17 percent in the fourth year. To arrive at our estimate by type of crime and year, we assumed impacts for each specific crime type followed this same pattern over time. As the impacts declined during the observation period and were near zero at the end of it, we did not extrapolate the benefits from reduced crime beyond the observation period.

The costs of crimes committed in the observation period may extend well beyond it. For example, a sample member who is arrested for armed robbery may spend several years in prison, and the victim may suffer consequences for years. These future costs are incorporated into the estimated social cost of the crime and are discounted so that they can be treated as if they occurred simultaneously with the arrest.[1]

4. Crime Against Participants

The above discussion refers to reductions in crime committed *by* youths participating in Job Corps. We assume that these reductions in criminal activity by Job Corps participants were not significantly offset by increases in criminal activity by others (an assumption of "no displacement"). Therefore, they represent a net benefit to society.

Benefits from reduced crime *against* participants are not so clearly a benefit to society. To estimate the dollar value of these crimes we used similar methods to the ones described above for crime committed *by* Job Corps participants. A key issue, however, is whether the reduction in crimes against Job Corps participants led to an overall reduction in crime, as we assume is the case for reduction in crimes by participants, or whether other people were victimized in the place of Job Corps participants. As a practical matter, we cannot know this. For the overall benefit-cost analysis, we assume that crimes committed against Job Corps participants would still have been committed, but against other victims. This is the assumption of "victim replacement." For example, if a youth goes to a Job Corps center and avoids being robbed, we assume the robber would still commit the crime, but against another victim. If all victims are replaced, the victimization costs are merely shifted from Job Corps participants to others, and the net benefit to society from a reduction in crimes against Job Corps participants is zero.

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[1] The impact estimates are based on arrests within the 48-month observation period. A preferred measure would include arrests resulting from *behavior* that took place within the observation period, regardless of when the arrest occurred. Because reliable data could not be collected on the timing of criminal incidents, we may slightly underestimate the impact of Job Corps on crime reduction, for two reasons: (1) impacts based on arrests early in the observation period may be biased toward zero if they reflect behavior *before* the youths were randomly

While victim replacement appears to be the most reasonable assumption, it may not hold for all crimes. For some crimes, moving the would-be victims to a safer place, such as a Job Corps center, might reduce overall crime in society. For example, domestic violence and some other assaults are more likely to target specific victims only. As noted, we cannot tell from our data which crimes against participants would be replaced and which would not. Our benchmark assumption of full victim replacement is motivated by the mix of crime types we observed, which favors robbery, burglary, and theft (primarily from motor vehicles). We show in Appendix B that by relaxing this assumption and assuming instead that there is *no* victim replacement, the net benefits to society would be just over $1,000 per participant higher.

5. Unmeasured Benefits

Some of the costs of crime cannot be feasibly quantified or tied to specific crimes. Therefore there will be some unmeasured benefits of reductions in crime not included in the estimates presented here. The unmeasured benefits include reductions in:

- Psychological burden on witnesses to violent crime and on victims' family members
- Lost companionship of family and friends of crime victims
- Fear of crime among neighborhood residents
- Protective measures taken by potential victims, such as the use of private security measures and activities forgone because of fear of crime

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(continued)
assigned, and (2) impact estimates late in the observation period do not reflect behavior that resulted in arrests after the observation period.

- Protective measures taken by government, such as police patrols
- Legal costs for civil actions taken by victims of crimes

If they could be measured, each of these would lead to a larger estimate of the benefit of the reduction in crime.

B. REDUCED CJS PROCESSING

This section presents estimates of the benefits of reduced CJS processing. We discuss the impacts on arrests, the social costs per arrest, and the net benefits to society. All of these benefits are realized through reductions in crime by Job Corps participants. We assume that the reduction in crime against participants does not lower the overall crime rate, and hence has no impact on CJS costs.

1. Impacts on Arrests

Most CJS costs vary with the number of arrests. Therefore, the impacts of Job Corps and social costs of each crime are expressed in terms of arrests for each type of crime. To account for the different costs of processing crimes of varying seriousness, we categorized arrests by the type of offense. In cases where a person was arrested and charged with more than one offense, we considered only the cost of processing the most serious charge, and assumed the cost of processing the same offender with the additional charges to be zero.[2]

The first column in Table V.1 presents the impacts of Job Corps on the number of arrests (in terms of arrests per thousand participants), where each arrest is classified by the most serious

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[2] Only 20 percent of arrests involved more than one charge. Of those, most included a drug, alcohol, or weapons violation.

TABLE V.1

BENEFITS FROM REDUCED CRIMINAL JUSTICE SYSTEM PROCESSING OF CRIMES COMMITTED BY JOB CORPS PARTICIPANTS

Crime Category/Charge	Impact (Arrests per 1,000 Participants)	Social Cost (1995 Dollars per Arrest)	Benefit to Society[a] (1995 Dollars)
Murder and Non-negligent Manslaughter	-0.7	$122,400	$83
Aggravated Assault and Related Violent Crimes			
Aggravated assault, attempted murder, forcible rape, kidnapping	1.5	9,600	-14
Robbery	-0.7	19,300	14
Burglary	-7.4	14,300	103
Theft and Other Property Crimes			
Arson, motor vehicle theft	-1.0	6,500	6
Larceny, other theft	1.1	5,100	-5
Shoplifting; buying, receiving, or possessing stolen property; vandalism; forgery or counterfeiting; fraud; writing bad checks; embezzlement; extortion	-2.6	1,200	3
Drug Law Violations			
Drug manufacture, sale, or distribution	-5.0	7,100	34
Drug use or possession	-9.5	1,200	11
Other Personal Crimes			
Simple assault or fighting, sex offenses other than forcible rape and prostitution, family offenses	-6.0	1,200	7
Miscellaneous Crimes			
Liquor law violations, disorderly conduct, loitering, curfew violations, trespassing, parole or probation violation, prostitution, weapons offenses, obstruction of justice, motor vehicle violations, gambling, smoking cigarettes under age, truancy, minor running away	-69.8***	1,200	81
All Crimes	-100.2***	--	$324

SOURCES: Impacts are estimated from baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews. Social costs were obtained from Cohen et al. (1994), Jacoby et al. (1990), Miller et al. (1996), and U.S. Department of Justice (1998).

[a] Because of discounting, benefit to society does not exactly match the product of the impact on arrests and the cost per arrest.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
*** Significantly different from zero at the .01 level, two-tailed test.

charge among the 41 crime types measured in our instrument.[3] Offense types are grouped into 11 broad categories for ease of presentation. Arrests where the most serious charge was a drug law violation were reduced by almost 14.5 arrests per thousand participants. Among the miscellaneous offenses, the impacts were largest for liquor law violations, such as driving under the influence of alcohol and public drunkenness. Smaller impacts were found for more serious crimes, such as murder and robbery. Job Corps has a relatively large impact on burglaries—arrests for burglary were reduced by 7.4 per thousand participants. Arrests where aggravated assault, rape, kidnapping, or theft was the most serious charge were slightly *higher* for Job Corps participants. When broken down by these 11 categories, only the impact on miscellaneous crimes was statistically significant.

2. CJS Costs per Arrest

The costs to society of processing an arrest of each crime type are also presented in Table V.1. The CJS cost estimates were based on the following four components:

1. ***Investigation.*** The costs of investigating each reported incident are spread over the number of arrests made for those incidents, resulting in an average investigation cost per arrest.
2. ***Booking and Arrest.*** Booking and arrest costs are incurred for every arrest made.
3. ***Prosecution and Trial.*** These costs include the value of time spent by lawyers, courtroom staff, jury members, and witnesses, plus the associated overhead and support costs used in prosecuting and defending a case. Also included in trial costs are the pre-trial detention (jail) costs usually borne by local governments. For those arrests where criminal charges were dropped before this stage, the prosecution and trial costs would be zero. Thus the average prosecution and trial costs represent the cost of cases actually prosecuted times the probability of an arrest leading to prosecution.

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[3] The 41 crime types are also listed in Table V.1, with the exception of the following offenses for which there were no reported arrests: justifiable homicide, peeping tom, pornography, blackmail, and bribery.

4. ***Post-Trial Costs.*** Post-trial costs depend mostly on sanctions. The cost of sanctions includes the cost of probation, parole, and prison terms actually served. For murder arrests, it also includes the cost of post-conviction review and capital punishment, multiplied by the probability of an arrest reaching that stage. Those arrests that do not result in conviction would have no post-trial costs. Those arrests that are plea-bargained to a lesser charge would typically have lower post-trial costs. Estimates are based on average sentences served by those arrested with the given charge.

The data sources and methods used to calculate the CJS costs per arrest for each crime type are described more fully in Appendix F. To summarize, they are drawn largely from a very detailed study (Jacoby et al. 1990) of CJS processing in four counties across the United States (Mecklenburg [NC], Ventura [CA], Allegheny [PA], and Alexandria [VA]). We used data from federal statistics on arrests, convictions, and average prison sentences served to update key assumptions made by Jacoby et al. (U.S. Department of Justice 1997 and 1998).

The estimated CJS cost of many of the less serious crimes was assumed to be $1,200, which was the estimated cost of processing an offender arrested for any misdemeanor. More serious crimes, such as drug dealing, arson, and motor vehicle theft have higher costs, because there is a higher likelihood of prosecution and longer trials for these crimes (Table V.1). Finally, burglary and violent crimes have substantially higher costs because they are more likely to involve substantial prison sentences.

The estimates of the CJS cost of murder deserve special attention, because murder is the most costly crime.[4] The components of the CJS cost of an arrest for murder are listed in Table V.2. The largest component is the cost of imprisonment, almost $86,000. The cost of prison per arrest is the average prison sentence actually served per convicted offender (9.6 years) multiplied

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[4] Murder includes non-negligent manslaughter. Attempted murder is considered a form of aggravated assault for our analysis. For most other crimes, unsuccessful attempts are included, in keeping with federal crime reporting conventions.

TABLE V.2

COMPONENTS OF THE CJS COST OF MURDER
(1995 Dollars)

Component	Cost per Arrest
Investigation	$1,444
Prosecution and Defense	11,990
Probation and Parole	658
Prison	85,661
Capital Punishment	22,646
Total	**$122,400**

SOURCE: Cohen et al. (1994), U.S. Department of Justice (1998), and Jacoby et al. (1990).

by the probability of a murder arrest resulting in non-capital conviction (64 percent) and by the cost per year in prison ($16,800), discounted using a 4 percent discount rate.

Although it is rare, capital punishment must be included in the CJS cost of murder.[5] Of the total arrests nationwide for murder, about two percent result in capital punishment (Appendix F). The CJS costs rise considerably in these cases, mostly because of the additional litigation, the extensive appellate and postconviction review, and the staff and materials needed to imprison and execute capital offenders. Several estimates of the cost of capital punishment per murder conviction are available, but none are definitive. We used an estimate of $1.8 million, based on data from New York state (Cohen et al. 1994). Other estimates range between $0.3 million in North Carolina (Cook and Slawson 1993) and nearly $19 million in Florida (Cohen et al. 1994). When multiplied by the probability of conviction and discounted for the fact that most of the costs of capital punishment are borne many years after the offense is committed, the cost per murder arrest for capital punishment is about $22,600. As shown in Table V.2, the estimated average total cost of processing a murder arrest (including costs of capital crimes) is thus estimated to be about $122,400.

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[5] One interview in the Job Corps study was conducted with a sample member who was on death row awaiting execution.

3. Benefits from Reduced CJS Processing

The benefits from the reduction of CJS processing costs are presented in the last column of Table V.1. The total benefit from the reduction in arrests was $324 per participant. Almost three-fifths of this benefit resulted from reductions in arrests for burglary and murder alone. Almost all the rest was accounted for by drug law violations and a host of less serious "miscellaneous" crimes such as disorderly conduct, parole violations, and liquor law violations. Job Corps had only a small impact on murder, but because it is such a costly crime, the benefit from the small impact was large. The benefit from less serious crimes was also large because, although the cost of each crime is low, Job Corps had a relatively large impact on the incidence of these crimes.

C. REDUCED CRIME VICTIMIZATION

This section presents estimates of the impact on victimizations from crimes by participants, the costs per victimization, and the resulting benefits. We also discuss the value of reduced crime against participants.

1. Impacts on Victimizations

The unit of analysis for appraising victim losses (both personal and property) is a *victimization*—an instance in which a person (or household or business) is the victim of a specific crime. A person can be the victim of more than one crime during any given incident. Each of these would be counted as a separate victimization. A loss would be incurred every time a person is victimized, whether or not an offender is arrested or charged.

To estimate the impacts of Job Corps on victimizations from crimes committed by participants, we began with impacts on arrests per participant for each type of criminal offense. Then we used national data and other secondary sources to estimate the number of victimizations of each type that occur per arrest. The number of victimizations per arrest is the product of three factors:

1. The number of reported criminal incidents as a fraction of the number of arrests (reciprocal of the arrest clearance rate)
2. The number of criminal incidents as a fraction of reported criminal incidents (reciprocal of the incident reporting rate)
3. The number of victimizations per criminal incident

The estimate of victimizations per arrest takes into account that there may be multiple victimizations in any incident, that not all incidents are reported, and that not all offenders are arrested. Data on each of these elements for each crime category were obtained from published sources. Details on the sources and estimates are provided in Appendix F. The number of victimizations per arrest range from 1.35 for a crime such as murder, which is almost always reported and very often leads to arrest, to 18.81 for larcenies, of which about three quarters go unreported (U.S. Department of Justice 1997) and over 80 percent are never "cleared" by arrest (U.S. Department of Justice 1998). Multiplying the impacts on arrests per participant by the number of victimizations per arrest for each type of crime yields the estimated impact of Job Corps on victimizations per participant (Figure V.1).[6]

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[6] Not all those arrested actually committed the crime with which they were charged. We assume that the number of innocent sample members arrested in the program and the control groups are equal.

These impacts, expressed in terms of victimizations per thousand participants in Table V.3, are generally larger than the corresponding impacts on arrests reported above for CJS costs, for two reasons. First, as noted above, the number of victimizations per arrest ranges from 1.35 to 18.81 and varies by crime. Second, the impact on arrests included each arrest multiple times to account for all charges brought for each arrest, whereas the impact on arrests used in the CJS benefit calculation included only the most serious charge. Both factors make the impacts on victimizations larger in absolute value than the impacts on arrests in Table V.1.

Although the impacts on victimizations were larger than the impacts on arrests, they followed a similar pattern by crime type. Reductions in less serious crimes were appreciable, and impacts on more serious crimes were generally smaller. Again, the exception was burglary, for which there was a reduction of 111 victimizations per participant. We found that Job Corps participants in our sample were slightly more likely to be arrested for larceny and some violent crimes, such as assault. Therefore, the impacts on victimizations are positive for these categories, although the impacts were not statistically significant. Several crime types, notably drug law violations, possession of stolen goods, and weapons offenses, are not listed in Table V.3, because we assume there are no direct, measurable victim costs for these crimes.

2. Costs per Victimization

We included the following four components in the measured cost of crime to victims:

1. ***Personal Injury.*** Medical treatment, and mental health treatment made necessary by personal injuries, are all included, whether or not treatment was sought. Cohen et al. (1994) argue that victims who do not seek needed treatment still bear the pain and suffering.
2. ***Lost Productivity.*** Lost wages and the equivalent value of lost time for housework, child care, and other uses of time are a cost of injuries sustained by crime victims. To the extent possible, these are included in the cost estimates.

TABLE V.3

BENEFITS FROM REDUCED CRIMINAL VICTIMIZATION IN CRIMES COMMITTED BY JOB CORPS PARTICIPANTS

Crime Category/Charge	Impact[a] (Victimizations per 1,000 Participants)	Social Cost (1995 Dollars per Victimization)	Benefit to Society (1995 Dollars)
Murder and Non-negligent Manslaughter	-0.9	$553,900	$509
Aggravated Assault and Related Violent Crimes			
Forcible Rape	6.7	7,500	-49
Aggravated assault, attempted murder, kidnapping	10.8	1,000	-11
Robbery	-10.8	2,300	24
Burglary	-111.0	2,800	302
Theft and Other Property Crimes			
Arson	-5.1	17,400	87
Motor vehicle theft	-7.6	4,300	32
Larceny	13.5	650	-9
Shoplifting, vandalism, forgery or counterfeiting, fraud, writing bad checks, embezzlement, blackmail or extortion, bribery	-5.0	150	1
Other Personal Crimes			
Simple assault or fighting, sex offenses other than forcible rape or prostitution, family offenses	-24.1	600	14
Miscellaneous Crimes			
Liquor law violations	-22.5***	700	15
All Crimes	-$156.0**	--	$916

SOURCE: Impacts are estimated from baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews. Sources of the estimates of the social costs are described in Appendix F.

[a] Calculated as the product of impact on arrest charges in each category and the corresponding number of victimizations per arrest.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

3. ***Property Loss.*** Victims may experience lost, damaged, destroyed, or stolen property. In the past, some benefit-cost analyses have treated the value of stolen property as a transfer from victims to criminals and hence not a net loss to society (Thornton et al. 1982). Here, however, we follow Trumbull (1990) and assume that benefit-cost analyses should not place a social value on illegitimate gains.

4. ***Insurance Processing.*** We included in the costs of victimization the administrative cost of life, health, and property insurance. The premiums and paid losses from insurance are assumed to average out to zero and represent transfers among people in a risk pool. The administrative costs associated with processing claims to compensate crime victims' losses, however, are considered here to be a cost to society.

Our estimates do not include the cost of victim services, family support, trauma to witnesses of crime, increased fear of crime among all potential victims, and protective measures people take to avoid or protect against future crime. These components, for which there are no reliable quantitative estimates, remain unmeasured. Therefore, our estimates of victimization costs should be interpreted as cautiously erring on the side of understating the potential benefits of the reduction in crime.

We estimated the costs to victims for each crime type based on a variety of published sources. The most important is the National Crime and Victimization Survey, which asks a nationally representative sample about their experiences as victims of each type of crime and about personal injury, lost days of work, and property loss. The estimated average cost of victimization accounts for the fact that many crimes do not result in any tangible losses. For example, losses for liquor law violations assume that some fraction of those offenses are for driving under the influence of alcohol, some of which result in accidents and injuries that would not have occurred if the driver had not been intoxicated. Thus the high cost of accidents is multiplied by the low probability that an accident will result, and the cost per liquor law violation is assumed to be about $700. The average costs of personal crimes (such as simple assault) and of crimes of fraud (such as forgery and passing bad checks), for which no published data were available, are assumed to be about $600 and $150 per victimization, respectively. Vandalism and shoplifting are estimated to cost the same on average per victimization. The costs for more serious crimes are considerably higher. Serious property crimes such as motor vehicle theft and arson can be very costly.

Again, murder deserves special attention. The cost to victims of murder is of course difficult to quantify. Nevertheless, it is important at least to recognize in the benefit-cost analysis the possibility that Job Corps can have an impact on violent crime and actually save lives. Rather than place a dollar value on a human life, we instead estimated the lost productivity of a typical murder victim. This approach is similar to using the amount that would be paid to victims' survivors from a life insurance claim to compensate them for the lost earnings of the family member. We also included the administrative costs of processing such a claim.

Using data from the Bureau of Labor Statistics' Current Population Survey, we estimated the average discounted value of the remaining lifetime earnings for a full-time worker with the characteristics of typical murder victims. These characteristics, which include age, sex, and race, were based on FBI statistics (U.S. Department of Justice 1999). The average victim was 32 years old and was assumed to have a retirement age of 62. The proportions of victims in each race and sex category were used to weight the data. We used the average earnings of full-time workers to place a positive value on the time of those who are not working in the labor market. We used data from the U.S. National Center for Health Statistics (U.S. Bureau of the Census 1998) to adjust the results for the probability of dying of other causes. The value of lost output of a typical murder victim is thus estimated to be almost $550,000. We included another $4,651, the cost of processing life insurance claims for those who were insured times the probability of carrying life insurance (Cohen et al. 1994). The total estimated cost per murder victim is thus about $554,000. This figure does not include the costs of funeral or emergency medical services, nor does it place a value on lost companionship or any of the other unmeasured elements discussed in Section A.5.

3. Benefits from Reduced Victimization by Participants

The total benefits of reduced victim costs is about $900 per Job Corps participant (see Table V.3). Murder accounts for over half the total benefits, with burglary accounting for a further third. Reduced arson, motor vehicle theft, and robbery account for another 16 percent of the total.

4. Benefits from Reduced Victimization Against Participants

We noted that Job Corps reduced crime by Job Corps participants, but the program also reduced the amount of crime committed against them. These benefits, which total $643 per participant in the four-year observation period, are presented in Table V.4. We used roughly the same categories of crime, so the victim costs are similar to those in Table V.3. The impacts are based on self-reported involvement as victims of crime and therefore measure victimizations directly.[7]

The benefits to participants are largely the result of reductions in two crimes committed against them: burglary and robbery (Table V.4). Reductions in these two crimes accounted for 80 percent of the total benefits over the four years. Most of the benefits from reduced

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[7] Self-reported victimization is measured only for the one-year period prior to each of the three follow-up interviews, so a continuous 48-month history of victimizations was not available. To produce estimates for each year of the observation period, we assumed the impacts on victimizations reported for the year prior to the 12-month interview to be representative of the impacts in the first year after random assignment (year 1), the impacts from the year prior to the 30-month interview to be representative of year 2, the average of the 30-month and 48-month impacts to be representative of year 3, and impacts from the year prior to the 48-month interview to be representative of year 4.

TABLE V.4

BENEFITS FROM REDUCED CRIME AGAINST PARTICIPANTS

Crime	Impact (Victimizations per 1,000 Participants)	Cost (1995 Dollars per Victimization)	Benefit to Participants[a] (1995 Dollars)
Assault[b]	-29.0	$1,000	$27
Burglary	-92.0***	2,800	249
Robbery	-120.5***	2,300	264
Larceny, Pickpocketing	-43.5	700	28
Motor Vehicle Theft	-19.0	4,300	76
Total[c]	-304.0	--	643

SOURCE: Impacts are estimated from baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews. Sources of the estimates of the social costs are described in Appendix F.

[a] Benefit to society is assumed to be zero.

[b] Assault category does not distinguish between simple and aggravated assault. We assume that 10 percent of all assaults were simple and the remainder were aggravated.

[c] Murder and other crimes not listed here were not measured.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

victimization were realized in the first half of the observation period. The benefits were about $200 per participant in each of the first two years and fell to only $80 per participant by year 4.

The notable difference between Tables V.3 and V.4 is that we did not include a benefit from reduced murders of Job Corps participants. Information on how many of our sample members were murdered was not available. Also, there were no savings to the CJS, because we assumed the reduction in crime against participants to be completely offset by the increase in crime against the rest of society. In the sensitivity analysis, reported in Appendix B, we did calculate and include the associated CJS costs and included the value of reduced murders of participants, based on the relative death rates in the program and control groups. The impact on murders of participants added about $100 to the benefits from reduced crime.

D. SUMMARY

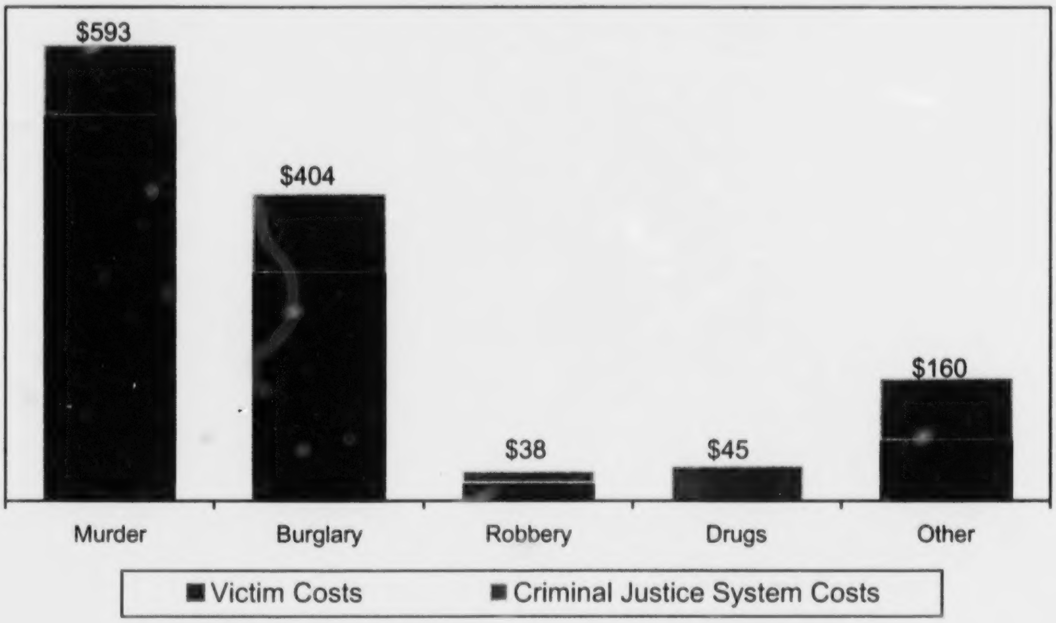
Reduced crime by Job Corps participants led to savings in both victim costs and CJS costs. These are net benefits to society. In addition, participants themselves were less often victims of crime, although we assumed these reductions in victim costs were shifted to others and there were no CJS cost savings because the crime that would have occurred against participants still occured.

Reduced victim costs accounted for about three-quarters of the total savings to society, and reduced CJS costs accounted for the remaining quarter (Table V.5). Figure V.2 summarizes these benefits, showing the amount of savings due to CJS and victim costs for each of several broad crime categories. The top portion of each bar in Figure V.2 represents the benefits from reduced CJS processing, and the lower portion of each bar represents benefits to victims. The largest savings by crime category came from reductions in murder and burglary. Reductions in murder alone accounted for nearly $600, almost half the total crime benefits. Burglary accounts for about one-third of the total. The rest was made up largely of CJS cost savings from reductions in drug law violations and a host of less serious offenses, plus some victim cost savings from reduced arson and motor vehicle theft (included as "other").

The entire $1,240 saved through reduced crime by participants is assumed to be a net benefit to society (Table V.5). The $324 saved through reduced CJS processing is a direct benefit to government. The rest, $916, is saved by society at large. Reduced crime *against* participants is assumed to be a benefit to participants only, who are better off by about $643 each, on average, over the four-year observation period. This benefit is offset, however, by an equal cost

FIGURE V.2

BENEFITS TO SOCIETY FROM REDUCED CRIME, BY CATEGORY OF CRIME
(1995 Dollars)



to the rest of society, assuming that the crime was not prevented but was merely shifted to victims not in Job Corps. Therefore, the net benefit to society from reduced crime against participants is zero

Considering the effects on crime both by and against participants, the net benefits to the rest of society from crime reduction are positive, but smaller than might have been expected. While the chance that the rest of society will be victimized by Job Corps participants goes down, their chance of being victimized by others (offenders who would otherwise have targeted Job Corps participants) goes up slightly. The net effect is a benefit of $597 to the rest of society.

TABLE V.5

BENEFITS FROM REDUCED CRIMINAL ACTIVITY
(1995 Dollars)

	Perspective		
Benefit	Society	Participants	Rest of Society
Reduced Crime By Participants			
Reduced CJS costs	$324	$0	$324
Reduced victim costs	916	0	916
Reduced Crime Against Participants			
Reduced CJS costs[a]	0	0	0
Reduced victim costs	0	643	-643
Total	$1,240	$643	$597

SOURCE: Tables V.1, V.3, and V.4.

[a] There is no reduction in CJS processing corresponding to reduced crime against participants, because the same crimes are committed against the rest of society.

The basic finding of this chapter was that the benefits to society from reduced crime were just over $1,200 per participant. Several sources of uncertainty could make the true benefits from reduced crime higher or lower than this figure. We conducted sensitivity analyses to see whether changing any of our assumptions affected these conclusions (Appendix B).

We found that the most important assumptions are the size of the estimate of the impact on murder and the assumption about whether crime against participants is replaced by crime against the rest of society. If we assumed that Job Corps had no impact on murder at all, the net benefits would be lower by about $600 per participant. If, on the other hand, we assumed the impact on murder were larger than our best estimate suggests, the benefit could be up to $3,000 higher per participant, using the upper limit of a 95 percent confidence interval for the estimated impact on murder.

The next most important assumption was that for every victimization that a participant avoided, someone else was victimized in the participant's place. This assumption places zero value to society on such crime reductions. If instead we assume that the value of these crime reductions is a full benefit to society, then the net benefits of Job Corps would be higher by the amount of the victim costs and an additional amount that represents the CJS cost savings because fewer offenders would have to be arrested and processed. We estimated these benefits to be about $1,200 higher than our benchmark. If we also include an estimate of the reduction in participants' probability of being a murder victim, the estimate of net benefits is another $160 per participant higher.

Our findings on the benefits from reduced crime were less sensitive to the other sources of uncertainty. They changed by less than a few hundred dollars per participant as we varied each assumption. For example, allowing for a higher cost per day in prison, a key ingredient in the CJS cost of crime, raised the benefits from reduced crime by about $100 per participant. Using an alternative set of estimates for the number of victimizations per arrest for each offense, a key ingredient in calculating reduced victim costs, our estimate of the benefits from reduced crime were lower by about $200 per participant.

VI. PROGRAM COSTS

Job Corps provides many intensive services to its participants and as a result uses considerable resources. Currently, the federal government spends over $1 billion a year on Job Corps. Whether or not Job Corps is a cost-effective investment of society's resources depends on whether the benefits discussed in the previous chapters exceed the value of the resources used by the program: its social costs. We estimate that Job Corps costs the rest of society, principally the federal government, nearly $16,500 per participant. However, the estimated cost to society is only $14,100 per participant. The cost to society differs from the cost to the rest of society because expenditures on student pay, food, and clothing are transfers—costs that are offset by equal benefits to students—and so are costs to the government but not to society.

We divide program costs into three main categories. The first and largest category contains the costs that are reported on Job Corps' financial reports. It includes both the costs incurred by the center operators as well as *centralized* costs, those that are incurred by the program but not by the center operators, such as the costs of outreach and admissions (OA). The second category encompasses those operating costs that are not reported on Job Corps' financial reports. These include the costs of administering the national and regional offices, grants and donations to the centers, and the opportunity cost of people who volunteer at the centers. The third category is capital expense, including the costs of Job Corps' land, buildings, furniture, and equipment.

The rest of this chapter is organized as follows. Section A describes our approach to estimating costs. Section B presents estimates of the reported operating costs of Job Corps. We describe estimates of the costs not reported on the program's financial reports and estimates of the cost of the capital used by Job Corps in Sections C and D. Our rationale for designating some of the program operating costs as transfers—costs to the government that are offset by benefits to the participants—is described in Section E. We conclude in Section F by summarizing the cost estimates and examining how these estimates vary between residential and nonresidential students and students attending different types of centers.

A. APPROACH TO ESTIMATING PROGRAM COSTS

Our approach was to estimate a cost for each participant in our research sample, based on the center attended, residential or nonresidential status, and the length of time spent in Job Corps. We then computed the average cost per participant in the research sample. This allowed us to compare average costs per participant with the average benefits per participant averaged over the same research sample.

We used this disaggregated approach instead of just multiplying the average cost per participant-year for all participants in Job Corps and the average length of their stay in Job Corps, for two reasons. First, the disaggregated approach allows us to generate cost estimates for subgroups of youth. This will allow us to address whether the program is cost-effective for most youth or just some groups. Second, if the time spent enrolled in Job Corps is correlated with the costs of participation (because, for example, students are enrolled longer in higher-cost centers), estimates based on an aggregated approach would be biased. However, this does not seem to be the case--our estimated costs per participant are within 1 percent of the overall costs per participant in Job Corps multiplied by the average length of stay.

1. Sources of Data

The cost estimates are based mainly on program expenditure data provided by the National Office of Job Corps. These data were collected on forms completed by the centers and submitted to the National Office, the ETA-2110 (from contract centers) and the ETA-2110F (from CCCs), as well as from data on expenditures made directly by the national and regional offices. Data on the number of students and the number of *slots* (places) for students at each center were compiled by Job Corps from the *Weekly Student Strength Reports* completed by each center.

The length of time each participant stayed in Job Corps was obtained from the program's Student Pay, Allotment, and Management Information System (SPAMIS). As described in Section C, we also collected data on unreported operating costs from a sample of 23 centers.

2. Years Included in the Cost Analysis

The estimates of the reported program costs are based on expenditures from three program years (PYs): PY 1994, PY 1995, and PY 1996.[1] More than 94 percent of the total days spent in Job Corps by participants in our research sample occurred in these three years: about 11 percent occurred in PY 1994, 63 percent in PY 1995, and 20 percent in PY 1996. We estimated a weighted average of the cost per participant per year over each of these three years, with the weights reflecting the distribution of the total days spent in the program by members of our sample across the three years.[2]

3. Estimating Costs per Slot-Year, per Participant-Year, and per Participant

Our estimates of the costs per participant were based on estimates of costs per slot-year, which we converted to costs per participant-year, and finally to costs per participant.

a. Costs per Slot-Year

We began by estimating the costs of one slot-year (one slot in Job Corps for one year). These are total costs of the program for the year divided by the average number of Job Corps slots available in that year. We estimated the costs per slot at each center. For centers that had both a residential and a nonresidential program, we used regression methods to estimate the average cost for a residential and a nonresidential slot separately. (We discuss how we did this in Section A.4). In this way, we estimated costs per slot for each participant in our sample based on the center attended and residential or nonresidential status.

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[1] A program year begins on July 1 and ends on June 30.

[2] Days spent in Job Corps after PY 1996 were assumed to have occurred in PY 1996. The weights were the same for all members if our sample regardless of which year they participated.

b. Costs per Participant-Year

Costs per participant-year are the costs of a student attending Job Corps for one year and are equal to total annual costs divided by the average number of students enrolled in Job Corps. If some slots are not filled, as is typically the case, costs per participant-year are larger than costs per slot-year. The difference between costs per slot-year and costs per participant-year depends on the proportion of slots that are filled, or the *capacity utilization rate.*[3] We calculated a separate capacity utilization rate for each center in each year, and if the center had both residential and nonresidential slots, we calculated a separate capacity utilization rate for residential and nonresidential slots. We then calculated the costs per participant-year for residential and nonresidential students at each center for each year by dividing the cost per slot-year by the appropriate capacity utilization rate. We then took the weighted average of the costs per participant-year in each of the three PYs (1994 through 1996).

c. Costs per Participant

Costs per participant are the costs that take into account the amount of time the student stays in Job Corps. They were calculated by multiplying the costs per participant-year by the proportion of a year the participants were enrolled in Job Corps.[4] If students were enrolled more than once, we included the time spent in Job Corps each time they were enrolled. On average, participants in our sample were enrolled for 7.5 months.[5]

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[3] Algebraically:
Costs per participant-year
= total costs / number of participants
= (total costs / number of slots) x number of slots / number of participants
= costs per slot-year / the capacity utilization rate.

4. Estimating the Costs of Residential and Nonresidential Participants

Residential participants live at Job Corps centers, and nonresidential participants live at home, so we expect the former to be more costly. For the 43 percent of centers that serve exclusively residential students and the 3 percent of centers that serve exclusively nonresidential students, there was no need to estimate separate costs by residential status, because the differences are already reflected in the costs of each of those centers. However, it is more difficult to allocate the center costs to residential and nonresidential students at the 54 percent of centers with both residential and nonresidential students. Because nonresidential students share classes with residential students at these centers and can receive nearly all the services available to residential students, there are no categories of reported costs that we can attribute to either residential or nonresidential students alone.

Our approach to allocating center costs by residential status in these centers with both residential and nonresidential students was to estimate the relationship between the proportion of each center's slots that are residential and the center's costs per slot. To do this, we exploited the variation between centers in the proportion of slots that are for residential students. To control for other factors that might also explain the variation in center costs, such as the type of center operator and the size of the center, we estimated regression models of center costs per slot. To allow for the possibility that differences in the proportion of residential slots have more impact on some costs than others, we estimated the relationship between the proportion of slots that are residential and the center's costs per slot for nine separate categories of costs. The findings from this exercise are summarized in Section F.2 and described in detail in Appendix G.

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[4] For the less than 1 percent of participants who were still attending Job Corps at the end of the observation period, we only included the amount of time they were in Job Corps during the observation period.

[5] For consistency with the cost data, we calculated the length of time sample members were enrolled using data from SPAMIS. A slightly longer length of stay was estimated using survey data (Schochet et al. 2001).

This approach to allocating by residential status could not be used to allocate the centralized costs, which by definition are not incurred by centers. Instead, we assumed that student pay per month is the same for residential and nonresidential participants. The cost of transporting residential students was allocated to residential students only. We assumed all other centralized costs, mainly the costs of OA and placement, to be the same for residential and nonresidential slots.

5. Adjusting for Unusually Low Capacity Utilization

In most years, Job Corps operates at close to full capacity, typically filling more than 95 percent of its slots. However, in PY 1994 and PY 1995, there was both a reduction in the number of youth enrolling in Job Corps and an increase in the number leaving the program, which caused the capacity utilization rate to fall to about 91 percent in PY 1994 and 89 percent in PY 1995. In response, the Job Corps National Office began an intensive media campaign to increase center enrollment, and by the beginning of PY 1996, centers were again operating at close to full capacity.

The fall in capacity utilization in PY 1994 and PY 1995 resulted in an increase in costs per participant-year. This is illustrated in Figure VI.1, which shows how Job Corps' reported operating costs per slot-year and per participant-year changed from PY 1991 to PY 1999. Costs per slot-year (illustrated by the lower line in the figure) follow a slowly rising trend. In most years, slots were not all full, and costs per participant-year (illustrated by the upper line in the

FIGURE VI.1

REPORTED PROGRAM OPERATING COSTS: PY 1991 TO PY 1999
(Thousands 1995 Dollars)

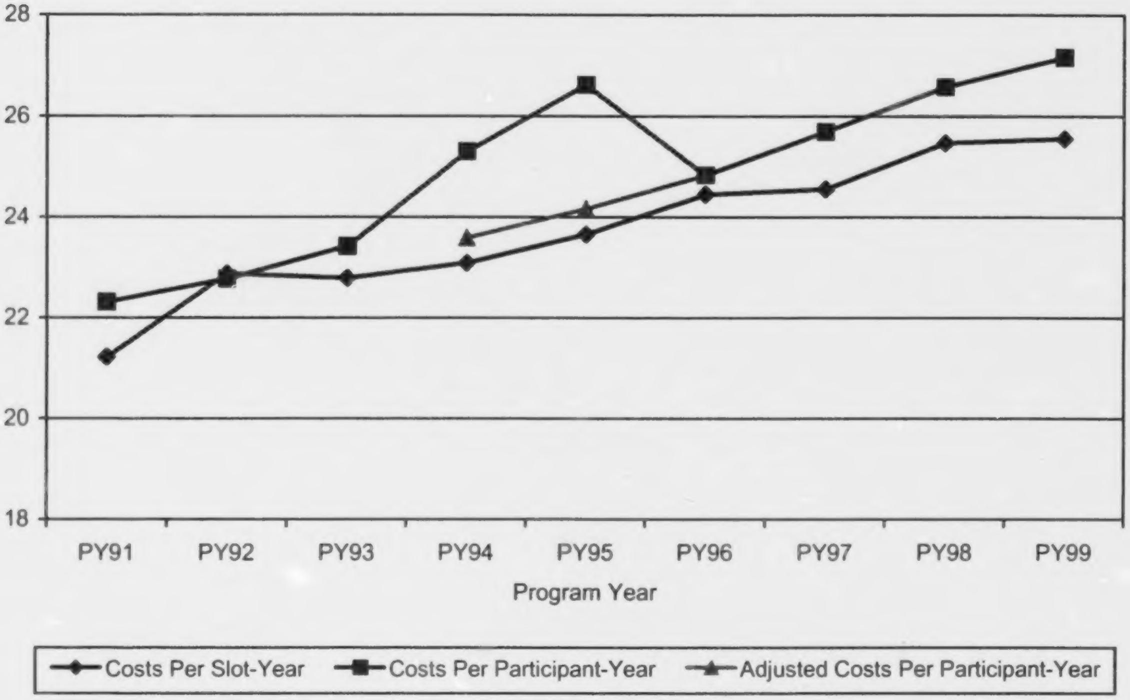

figure) exceeded costs per slot-year, usually by a small amount, which reflected that centers were typically operating at close to full capacity. In PY 1994 and PY 1995, however, while costs per slot-year continued the slight upward trend, costs per participant-year increased sharply and exceeded costs per slot-year by an average of about $2,500, reflecting the fall in capacity utilization rates in those years.

Two events that occurred in PY 1994 and PY 1995 coincide with the fall in capacity utilization. First, in late PY 1994, Job Corps introduced strict zero-tolerance (ZT) policies for violence and drugs, so that students who committed certain offenses could be rapidly expelled from the program. These policies also may have affected recruiting, as users of drugs or alcohol may have decided not to apply (Johnson et al. 1999). Second, this study, which also began in PY 1994, randomly assigned 7 percent of eligible applicants to a control group that was not allowed to enroll in the program for three years. However, although the study was a significant factor in the reduction in capacity utilization, it was not the major one. Prohibiting control group members from enrolling accounted for only 26 percent of the empty slots at the beginning of PY 1995, a drop in new arrivals beyond the removal of the control group members accounted for about 42 percent of the empty slots, and an increase in terminations accounted for the remaining 32 percent of the empty slots (Burghardt et al. 1999).

As neither the study nor the phasing in of a significant new policy is a typical event, we adjusted the cost estimates for the capacity underutilization in PYs 1994 and 1995. Costs per participant-year in those years were calculated under the assumption that each center was operating at a capacity utilization equal to its average in PYs 1993 and 1996. Costs per participant-year in PY 1996 were calculated using the center's actual capacity utilization in that year. The middle line in Figure VI.1 shows the PY 1994 and PY 1995 costs per participant-year adjusted to reflect what the costs would have been with an overall capacity utilization of 97.8 percent, the average in PYs 1993 and 1996, and actual costs per participant-year in PY 1996. As the figure illustrates, the costs per participant-year adjusted in this way follow the trend in costs per participant-year that began before PY 1994 and continued after PY 1995.

Our goal was to estimate typical long-term costs rather than the actual costs during the study. We assume that the reduction in capacity utilization did not affect the estimated benefits from the program. In our judgment, the reduction in capacity utilization probably had a negligible effect on the program's benefits. While the fall in capacity utilization may have increased benefits by, for example, increasing the instructor-student ratio, benefits from the program may also have fallen in those years because of the disruption caused by the ZT policies. Not adjusting for the unusually low capacity utilization would increase our costs estimate by less than $1,000 per participant (Appendix B).

B. REPORTED OPERATING COSTS

The operating costs incurred by the program and contained in their financial reports make up most of the program costs. The reported operating costs for members of our sample were over $23,000 for each slot provided for one year in Job Corps and nearly $24,000 for a participant to spend the year in Job Corps (Table A.3). As participants spent on average about 7.5 months in Job Corps, reported operating costs are about $15,000 per participant (Table VI.1). While all these costs accrue to the government, as we will describe when discussing transfers in Section E, some are offset by equal benefits to participants; hence, not all the nearly $15,000 per participant is a cost to society.

1. Costs Incurred by the Center

Nearly 80 percent of all reported operating costs are incurred by the centers themselves. We divided the costs incurred by the centers into seven categories that related to the functions of the center:

1. ***Academic Instruction.*** This includes all the costs related to the academic education program, including salaries and fringe benefits of instructors, and books, materials and other supplies used in the academic education program. Academic instruction accounted for 7 percent of all costs.

TABLE VI.1

AVERAGE REPORTED PROGRAM OPERATING COSTS FOR RESEARCH SAMPLE PARTICIPANTS

Component	Cost Per Participant (1995 Dollars)	Percentage of All Reported Program Operating Costs
Costs Incurred by the Centers		
Academic Instruction	$1,041	7.0%
Vocational Training	1,925	12.9
Counseling, Residential Advisors, and Other Instruction	3,047	20.5
Support Services		
Food[a]	701	4.7
Clothing	230	1.5
Other[b]	1,174	7.9
Health Services	834	5.6
Center Administration	2,368	15.9
Center Capital Expenses	431	2.9
Total Operating Costs Incurred by the Centers	**11,752**	**78.9**
Centralized Costs		
Student Pay	1,427	9.6
Outreach, Admissions, and Placement	1,062	7.1
Non-local Transportation	223	1.5
National and Regional Office Support	232	1.6
Other	202	1.4
Total Centralized Costs	**3,147**	**21.1**
Total[c]	$14,898	100.0%

SOURCE National Office of Job Corps.

[a] Includes only the cost of purchasing food ingredients. It does not include the costs of preparing the food.

[b] Includes the costs of preparing food, laundry service, local transportation, and any child care provided on center.

[c] Because of rounding, the totals may not equal the sum of the rows.

2. ***Vocational Training.*** This includes all the costs related to the vocational training program, including salaries and fringe benefits of instructors, and books, materials and supplies used in the vocational training program.[6] The costs of the raw materials used in VST projects are included in the "center capital expenses" category. Vocational training accounted for 13 percent of all costs.

3. ***Counseling, Residential Advisors, and Other Instruction.*** This includes all the costs, for both personnel and materials and supplies, related to counseling, social skills training, the recreation program, the orientation program, the Inter-Group Relations program, and any other instruction provided by the centers. It includes all the salaries and fringe benefits of the residential advisors. This category accounted for 21 percent of the reported operating costs, reflecting the importance of counselors and other instructors in Job Corps.

4. ***Support Services.*** This includes the costs related to meals, clothing, laundry service, local transportation, and any child care that the center may provide. This includes the costs of both personnel and supplies. Support services accounted for about 14 percent of all reported program operating costs.

5. ***Health Services.*** This includes the costs of all medical, dental, and mental-health care to Job Corps students. It includes the costs both of personnel employed directly by the center and of outside health professionals who care for Job Corps students and whose services are paid for by the program. This category also includes the cost of the alcohol and other drugs of abuse (AODA) program. Health services accounted for 6 percent of all reported program operating costs.

6. ***Center Administration.*** This includes the costs of the administration functions within the center, including the personnel costs of the center director, accountants, financial offices, and their support staff. Center administration accounted for 16 percent of all reported program operating costs.

7. ***Center Capital Expenses.*** Centers incur three types of capital expenses: (1) purchases of furniture and equipment, (2) General Services Administration (GSA) vehicles used by the center,[7] and (3) the costs of materials used in the VST projects. Each of these capital expenses was relatively small, and together they accounted for only 3 percent of all reported program operating costs, so we treated them as operating costs.

In addition to the direct costs of personnel and materials, the centers report overhead expenses, including facility maintenance costs, security costs, communications, utilities and fuel, insurance, and the contractors' fees. We allocated these overhead costs across the first six cost categories listed above using the same allocation formulas Job Corps uses when preparing its financial reports.[8]

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[6] This includes the instructors hired under National Training Contracts and paid for by the National Office.

[7] GSA amortizes the cost of its vehicles to a monthly rental expense.

2. Centralized Costs

About 20 percent of reported program operating costs were not incurred by center operators, but were incurred by the national and regional offices of Job Corps while administering the program. Reported centralized costs fall into five categories:

1. ***Student Pay.*** This includes all payments to students, including those for (1) each day of participation in Job Corps, (2) students' dependents, (3) bonuses for achievement and positive behaviors, (4) termination bonuses, and (5) readjustment allowances. On average, Job Corps students received $1,427 in student pay. This was the most important category of centralized costs, accounting for 10 percent of all reported operating costs.
2. ***OA and Placement.*** This includes all the costs related to recruiting and screening and placement services. These costs accounted for 7 percent of all reported operating costs.
3. ***Non-local Transportation.*** This is the cost of transporting residential students to and from their homes and the centers. These costs accounted for less than 2 percent of all reported costs.
4. ***National and Regional Office Support of Centers.*** This includes any costs the national and regional offices may incur in contracting out services to provide center support. It includes, for example, the costs of advice from health professionals on applicants with health problems. The personnel and other expenses of operating the national and regional offices are not included in this category, but are included as unreported costs (see Section C below). National and regional office support costs made up less than 2 percent of all reported program operating costs.
5. ***Other Operating Costs.*** This includes all the miscellaneous costs not included in the other four categories. For example, it includes the costs of architectural and engineering support provided when the National Office considers the construction needs of the centers and the costs of running SPAMIS, the program's management information system. Together these costs accounted for about 1 percent of all reported program operating costs.

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[8] While most overhead costs are allocated to the cost categories according to the proportion of square footage of the centers' buildings used for each function, some costs are distributed according to the number of full-time-equivalent staff, telephones, or center vehicle mileage.

C. UNREPORTED OPERATING COSTS

Most of Job Corps' operating costs are reported on its financial reports. However, some costs that are incurred in providing Job Corps services are not paid out of Job Corps' budget and hence are not listed on the financial reports. The unreported costs fall into three categories: (1) the costs of operating the national and regional offices, (2) the cost of donated items and services, and (3) grants received by the centers. Table VI.2 presents estimates of these unreported operating costs, which together account for $554 per participant, less than 4 percent of the reported program operating costs.

The costs of salaries and expenses of staff at the national and regional offices—over $16 million, or $266 per participant—were estimated by an independent auditor of Job Corps' 1993 expenses (R. Navarro and Associates, Inc. 1995). Their estimate also included a prorated share of the salaries and expenses incurred by the Employment and Training Administration of DOL, which oversees DOL's training programs and employment services.

In a special study of resource use at 23 centers in 1996 and 1997,[9] we estimated the market value of donated goods and services to Job Corps. In total, the figure came to $246 per participant. The types of goods and services received included:

- ***GSA Goods.*** The centers received a wide range of items, including furniture, equipment, and clothing. We estimated that Job Corps receives GSA items worth on average $146 per participant.
- ***Medical Supplies and Services.*** Centers received both donated medical supplies, such as vaccines and contraceptives, and donated services from medical professionals. Typically, the supplies and services, valued at about $19 per participant, were obtained from state or county health departments, but some were obtained from private companies and nonprofit associations.

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[9] Details of this special study are provided in Appendix H.

TABLE VI.2

COSTS NOT REPORTED ON PROGRAM FINANCIAL REPORTS
(1995 Dollars)

Component	Total Annual Value ($000s)	Cost Per Participant
National and Regional Office Staff	$16,052	$266
Donated Goods and Services		
GSA Goods	8,784	146
Medical Supplies and Services	1,169	19
Other Donated Goods	1,680	28
Other Donated Services	3,192	53
Total	14,825	246
Grants		
Education	1,733	29
Other	812	13
Total	2,545	42
Total	$33,422	$554

SOURCE: R. Navarro and Associates Inc. (1995) and a special study of resource use at 23 centers conducted in 1996 and 1997 as part of the National Job Corps Study.

- ***Other Donated Goods.*** In addition to GSA surplus goods and medical supplies, Job Corps received a variety of other donated goods amounting to about $28 per participant. Examples include books from a local library and a smoking cessation video from a private company. Job Corps also received food, valued at $3 per participant, from the U.S. Department of Agriculture and state departments of agriculture.
- ***Other Donated Services.*** Some centers have volunteers who help in many different ways, including tutoring, counseling, coaching, and providing clerical assistance. The volunteers include students, trained professionals, and members of the local government, as well as people with no affiliation. We estimate that these services total $53 per participant.

Some centers used grants to pay for some of their costs that otherwise would be paid for out of program expenditures and so are a cost to society. Centers frequently help students apply for education grants, such as Pell Grants, Federal Supplemental Educational Opportunity Grants, and state education grants, to offset some of the costs of attending classes at local colleges. These are typically paid directly to the college and offset some of the fees that Job Corps would otherwise have paid. Some centers also received state government grants, AFDC grants to cover some of the costs of providing child care at the center, and private donations. We estimated that the centers received annually over $2.5 million in grants, or about $42 per participant.

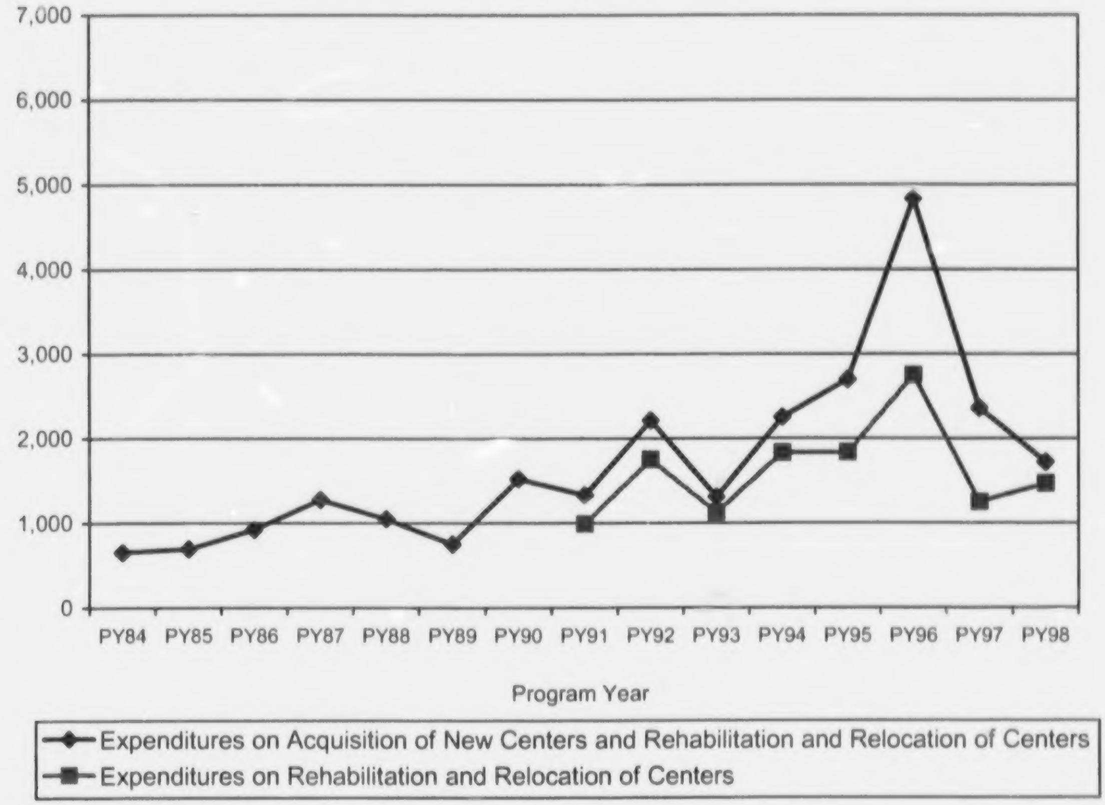
D. CAPITAL COSTS

Job Corps has acquired a considerable amount of capital for its centers, including land, buildings, equipment, and furniture. Expenditures on capital differ from operating costs in that they result in the acquisition of assets that last more than one year. Treating expenditures on capital as costs in the year they are incurred ignores the fact that the program has acquired an asset that has value and can be sold. The economic cost of capital in any one year has two components: (1) the amount by which the capital loses market value (depreciates) in the year, and (2) the return that is forgone by not selling the capital and investing the resources in alternative assets. Our approach was to estimate the amount by which the capital in Job Corps depreciates each year. Because data on the value of all the capital used by Job Corps are not available, we did not measure the return that is forgone by not investing the capital in alternative assets.

Job Corps receives a separate congressional appropriation for capital expenditures, referred to as facility construction, rehabilitation, and acquisition (CRA). Expenditures of CRA funds per slot are presented in Figure VI.2. While in the 1980s CRA expenditures averaged less than $1,000 per slot, they rose considerably in the 1990s when Job Corps renovated many of its run-down centers and the program was expanding and adding new centers. CRA expenditures peaked at nearly $5,000 per slot in PY 1996. Since PY 1991, Job Corps has reported three categories of CRA expenditures: (1) acquisition of new centers, (2) rehabilitation of centers,

FIGURE VI.2

CONSTRUCTION, REHABILITATION, AND ACQUISITION EXPENDITURES PER SLOT
(1995 Dollars)



and (3) relocation of centers to new facilities. The lower line in Figure VI.2 shows the CRA expenditures per slot on rehabilitating and relocating centers.

We estimated the cost of capital using expenditures on the rehabilitation and relocation of centers. We assumed that these expenditures are used to maintain the capital at its market value and offset its depreciation, and that expenditures to acquire new centers are to expand the program. This approach could underestimate capital costs if some of the costs of acquisition of new centers are to replace centers that have been closed. However, we could also overestimate the cost of depreciation by ignoring the appreciation of land values that has occurred in many areas.

The amount spent on rehabilitation and relocation of centers has varied from a low of $992 per slot in PY 1991 to $2,751 per slot in PY 1996. Because of the large year-to-year fluctuations in the amount spent on center rehabilitation and relocation, our benchmark estimate of the cost of capital is based on the average amount spent per slot on center rehabilitation and relocation since PY 1991, when the data first were reported. This average is $1,628 per slot, or $1,037 per participant. Our estimate of capital costs per participant changes by less than $500 when averages are taken over different years or when all CRA expenditures, rather than just those for rehabilitation and relocation of centers, are used (Appendix B).

About a fourth of center operators pay some rent for the center facilities. If these rents are set at their market value, they should capture the full capital cost of the land and buildings, including both the depreciation and the forgone interest on the value of the assets. However, as the facilities are often rented from other government agencies, these "rents" are not all set competitively and hence probably do not reflect the true market value of the land and buildings. Also, they exclude the value of furniture and equipment. The rents are extremely low. Some centers pay less than $10 per year per slot, while the average is less than $500 per year per slot, lower than our estimate of the cost of depreciation alone. As these rents probably underestimate the cost of capital, we used the cost of rehabilitating and relocating as the cost of capital for all centers, regardless of whether they are owned or leased. To avoid double counting the capital costs, we did not include the rental amounts in our estimate of operating costs. Including the rent amounts for those center operators that lease their facilities would add about $80 per participant to our estimate of program operating costs.

E. TRANSFERS: COSTS OFFSET BY BENEFITS TO PARTICIPANTS

While all expenditures on Job Corps are viewed as investments in the participants' future, some expenditures have intrinsic value to Job Corps participants irrespective of their value as an investment in their future. These expenditures are transfers—they are costs to the government, but they are offset by an equal benefit to Job Corps participants. Because resources are not used up but are simply transferred to participants from other members of society, the transfers are excluded from our calculations of benefits and costs of the program to society. Student pay is the best example of these transfers—the cash payments to Job Corps students have value to the participants whether or not Job Corps affects their future lives. Our criterion for determining whether a good or service is a transfer is whether it has *substantial* intrinsic value to the student apart from its role in the education and training process. We applied this criterion by asking, Would a similar youth not attending Job Corps be willing to pay for this good or service?

We included three categories of expenses as transfers: (1) student pay, (2) food (the costs of purchasing the ingredients for meals), and (3) expenditures on clothing. Student pay is clearly a transfer. Food is also a transfer, because participants would probably be willing to pay the cost of their food. We counted as a transfer only the cost of purchasing the food ingredients and excluded the meal preparation costs, for two reasons. First, as a practical matter, centers do not report the costs of meal preparation separately from the costs of other support services. Second, students may not be willing to pay the full cost of the food as it is prepared at the center. As most of the program's expenditures on clothes were given to the students in the form of an allowance to buy clothes of their choosing, we view these expenditures as transfers.

Several other expenses may be at least partially transfers, including medical and dental services, recreation activities, and housing, but they were not included as transfers, mainly because of data limitations. Some medical and dental services, such as access to free medical care, have intrinsic value to the students. However, costs reported for medical and dental services also included the costs of services that may have no intrinsic value, such as drug tests, mandatory medical examinations, wellness programs, and the AODA program. The recreation program, which typically includes team sports, fitness classes, open hours at a gym, and game and television rooms, as well as cultural trips into the community, probably does have intrinsic value to the students apart from its training and education role. Unfortunately the costs of the recreation program are reported together with the costs of counseling, residential advisors, and other instruction, most of which are not transfers. While the students may be willing to pay for some of their housing, reliable data on the costs of the dormitories separate from other center facilities are not available.

We estimate that the total value of transfers—student pay, food, and clothing—was $2,361 per participant (Table VI.3). These transfers were mainly expenses incurred by the program and hence are included in reported program operating costs. However, a small amount of food (worth $3 per participant) was donated to Job Corps and was included in unreported program operating costs. Student pay made up about 60 percent of the transfers, food about 30 percent, and clothing the remaining 10 percent.

TABLE VI.3

TRANSFERS PER PARTICIPANT
(1995 Dollars)

Transfers	Costs per Participant
Student Pay	$1,427
Food[a]	704
Clothing	230
Total	**$2,361**

SOURCE: Table VI.1

[a] The reported costs of food are $701 per participant. Centers also receive donations of food worth $3 per participant, which are unreported costs.

F. SUMMARY AND SUBGROUP ANALYSIS

This final section summarizes our estimates of the total program costs for all participants and for selected subgroups of participants.

1. Summary

We estimate that Job Corps costs society $14,128 per participant (Table VI.4). It costs the rest of society, mainly the government, $16,489 per participant. The difference between the cost to society and the cost to the rest of society, $2,361, is an estimate of the benefit to Job Corps participants of the goods and services they receive that have intrinsic value apart from their role in education and training: student pay, food and clothing. These transfers are worth about 14 percent of the total costs of the program to the rest of society.

Estimating costs required three main assumptions: (1) the capacity underutilization in PY 1994 and PY 1995 was temporary and did not affect the benefits from the program, (2) the average capital expenditures on the rehabilitation and relocation of centers between PY 1991 and

TABLE VI.4

SUMMARY OF COSTS PER PARTICIPANT[a]
(1995 Dollars)

Cost	Perspective		
	Society	Participants	Rest of Society
Reported Program Operating Costs (Net of Transfers)[b]	-$12,540	0	-$12,540
Unreported Program Operating Costs (Net of Transfers)[c]	-551	0	-551
Capital Costs	-1,037	0	-1,037
Student Pay, Food, and Clothing (Transfers)	0	+2,361	-2,361
Total[d]	-$14,128	+$2,361	-$16,489

SOURCE: Tables VI.1, VI.2, VI.3, and Figure VI.2.

[a] For consistency with the other summary tables, we present costs as negatives.

[b] Student pay, clothing, and reported food expenditures.

[c] Unreported food donations total $3 per participant.

[d] Because of rounding, total may not equal the sum of the rows.

PY 1998 was a good estimate of the amount that capital depreciates each year, and (3) the only transfers are student pay and expenditures on food and clothing. However, replacing any one of these assumptions with a reasonable alternative does not make a large difference in our cost estimates, changing them by less than $1,000 per participant (Appendix B).

Reflecting the relative intensity of the services it provides, Job Corps is much more costly than other education or training programs. If a youth, instead of spending 7.5 months in Job Corps, spent an equivalent number of months enrolled in high school, the cost to society would be only about $6,300. In 1997, JTPA's Title II-B youth training program—a much less intensive program than Job Corps—spent only about $1,400 per participant. The Jobstart demonstration, conducted in the 1980s, was modeled on Job Corps and included many of the same program components (academic instruction, vocational training, and training-related support services). It was much less costly than Job Corps, at about $6,000 per participant (Cave et al. 1993). However, the program was not residential and in most sites did not offer the same intensity of services as Job Corps. On average, Jobstart participants spent only about 450 hours in education, training, or other program activities (Cave et al. 1993), much less than the estimate of over 1,000 hours spent in education and training in Job Corps (Schochet et al. 2001).

2. Costs by Subgroup

We estimated costs separately for residential and nonresidential students and students attending different centers. Examining the costs for different groups of youth is interesting for two reasons. First, it shows that costs do not vary greatly between residential and nonresidential students or students attending different types of centers. Second, it allows us to compare the benefits and costs of subgroups of youth and address whether the program is cost-effective for both residential and nonresidential students and for youth who attend different types of centers.

As we cannot observe the residential status of control group members had they been allowed to enroll in Job Corps nor the center they would have attended, we asked OA counselors to predict, prior to random assignment, whether each Job Corps applicant would be assigned to a residential or nonresidential slot and the center to which each applicant would be assigned. The impacts of Job Corps were estimated for subgroups by comparing the outcomes of program group and control group members by whether they were designated as a residential or nonresidential student and by the center they were predicted to attend. As we will compare these costs to the benefits from these impacts, and the estimates of benefits are only available for the designated subgroups, we present the average costs for participants defined by these designated subgroups. As the OA counselors were accurate in their predictions, using the predicted rather than actual status of our research sample members makes little difference to our conclusions.[10]

Costs were estimated separately for subgroups defined by:

- ***Residential Status.*** We estimated costs for the 14 percent of students designated as residential students and the 86 percent of students designated as nonresidential students.
- ***Center Operator.*** We estimated costs for the 85 percent of students who were predicted to attend *contract centers* (those operated by private organizations) and the 15 percent of students who were predicted to attend CCCs (operated by the U.S. Departments of Agriculture or Interior).
- ***Center Size.*** We estimated costs for the 20 percent of students who were predicted to attend small centers (225 slots or less), the 45 percent predicted to attend medium centers (226 to 495 slots), and the remaining 35 percent predicted to attend large centers (more than 495 slots).

Care should be taken when interpreting differences in costs between subgroups. We estimated the average costs of students who were predicted to participate in the residential and nonresidential components. Because these components differ in the types of students they serve, we cannot infer from these estimates the costs that would be incurred if the types of youth who are currently residential became nonresidential students, or vice versa. Similarly, the differences between costs by type of center may reflect differences in the students they serve and their geographical location. Hence, we cannot predict how the costs of a CCC would change if it was operated by a private agency or if the size of any one center changed. Our estimates reflect the costs of the residential and nonresidential components and different types of centers for the students they typically serve.

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[10] About 98 percent of all enrollees designated for residential slots actually enrolled in them, compared to about 88 percent of program group enrollees designated for nonresidential slots. About 93 percent of program group enrollees actually enrolled in the center the OA counselor had predicted.

Three main factors determine the differences between subgroups in the costs per participant: (1) reported program costs per slot, (2) the capacity utilization rate, and (3) the length of time in Job Corps. Costs per participant are higher if (1) costs per slot are higher, (2) capacity utilization is lower, or (3) students spend longer in the program. Table IV.5 presents summary statistics of each of these factors and the estimated average cost to society per participant by subgroup.

TABLE VI.5

PROGRAM COSTS BY DESIGNATED RESIDENTIAL STATUS AND CENTER TYPE

Designated Subgroup	Reported Program Costs per Slot (1995 Dollars)	Capacity Utilization (PY 1996)	Average Length of Stay (Days)	Cost to Society per Participant (1995 Dollars)
Residential Status				
Residential	$23,468	96%	227	$14,705
Nonresidential	21,514	117	236	11,723
Center Operator				
Contract	22,731	98	225	13,600
CCC	25,796	99	229	15,977
Center Size				
Small	25,075	100	227	15,112
Medium	23,556	98	217	13,736
Large	21,701	99	237	13,686
All Centers	$23,233	98	228	$14,128

SOURCE: National Office of Job Corps

a. Residential Status

The cost to society of a residential student attending Job Corps is only $2,982 (25 percent) more than that of a nonresidential student. This finding suggests that the residential aspect of the program alone does not explain the program's high costs. It costs society on average about $11,700 per participant for a youth to attend Job Corps, even if the student is nonresidential.

Average reported program operating costs *per slot* were only about 9 percent higher for residential slots than for nonresidential slots. The costs differed by so little because, apart from a dormitory bed, Job Corps offers the same services to both residential and nonresidential students. Estimates of the effect of the proportion of residential students on costs per slot in centers that have both residential and nonresidential students were statistically significant for only four categories of center operating costs: (1) counseling, residential advisors, and other instruction; (2) food; (3) health services; and (4) center capital expenses.[11] Table VI.6 presents average reported program operating costs for residential and nonresidential slots by category of costs. Costs are higher for residential slots in the following categories:

- ***Counseling, Residential Advisors, and Other Instruction.*** These costs were about 37 percent higher for residential slots. Residential students have a much greater need for residential advisors who supervise them while they are in their dormitories. However, nonresidential students may still receive social skills training from residential advisors and require similar counseling and other instruction as residential students. Residential-nonresidential differences in this cost category explain 69 percent of the total difference in the cost between residential and nonresidential slots.

- ***Food.*** The costs of the ingredients of center meals were $417 (57 percent) higher for residential slots than for nonresidential slots. While nonresidential students are allowed to eat all their meals at the center, many choose not to do so.

- ***Health Services.*** The costs of health services were about $206 (18 percent) higher for residential slots than nonresidential slots. While the same medical and dental services are offered to both residential and nonresidential students, nonresidential students may prefer to use their own physician rather than the physicians at the centers.

- ***Center Capital Expenses.*** The centers' capital expenses were about $289 (68 percent) higher for residential slots. The increase was due to an increase in expenditures on both VST materials and the cost of vehicles on the center. This may be because centers in isolated areas have high VST and transportation costs and few nonresidential slots.

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[11] These estimates are presented in Appendix G.

TABLE VI.6

REPORTED OPERATING COSTS PER SLOT, BY DESIGNATED RESIDENTIAL STATUS
(1995 Dollars)

Cost Category	Residential Slots[a]	Nonresidential Slots[b]	Dollar Difference	Percentage Difference
Counseling, Residential Advisors, and Other Instruction	$4,935	$3,593	$1,342	37.4%
Food	1,148	731	417	57.1
Health Services	1,331	1,125	206	18.3
Center Capital Expenses	715	426	289	67.9
Other Center Costs	10,527	11,024	-496	-4.5
Non-local Transportation	364	51[c]	312	--
Other Centralized Costs	4,448	4,565	-117	-2.6
Total	$23,468	$21,514	$1,954	9.1%

SOURCE: National Office of Job Corps

[a] The average is taken over slots filled by participants designated for residential slots.

[b] The average is taken over slots filled by participants designated for nonresidential slots.

[c] The average for this cost category is not zero, because some students who are predicted to enroll in a nonresidential slot actually enroll in a residential slot.

The higher costs for residential slots in the categories listed above were slightly offset by lower costs in academic instruction, center administration, and support services other than food and clothes.

We assume that the centralized costs do not vary between residential and nonresidential slots, except that the cost of transporting residential students to and from the center is clearly incurred only for residential students.[12] We assume that the capital costs of the dormitories were incurred by residential students only, but all other capital costs were incurred by all students.[13] We assume that unreported operating costs differ between residential and nonresidential students by the same percentage as reported operating costs.

The residential-nonresidential difference between the costs *per participant* (25 percent) was larger than the residential-nonresidential difference in the program operating costs *per slot* (9 percent) for two reasons. First, capital costs per slot were nearly 50 percent higher for residential slots than for nonresidential slots. Second, the nonresidential slots were more likely to be filled. In PY 1996, the number of nonresidential students exceeded the slots assigned to them by 17 percent, while the residential components were still running at under capacity, and the lower capacity utilization increases cost per participant. However, the residential-nonresidential cost difference is reduced slightly because nonresidential students spend about 4 percent longer on average in Job Corps than residential students.

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[12] The average for this cost category is not zero for nonresidential slots, because some students who are predicted to enroll in a nonresidential slot actually enroll in a residential slot.

[13] A study of 15 centers (National Office of Job Corps 1993) found that 40 percent of the square footage of the centers' buildings was made up of dormitories, office space, or recreational facilities. We assumed that 75 percent of this, or 30 percent of the total capital costs, was accounted for by dormitories alone.

b. Center Operator and Center Size

Costs did not vary much between contract centers and CCCs or between centers of different sizes. The cost of a participant at a CCC exceeded the cost of a participant at a contract center, but the difference was only about $2,400 (17 percent). The cost of a participant at a small center was higher than the cost at a medium or large center, but the difference was only about $1,400 (10 percent). These differences were due mainly to differences in the costs per slot, which were higher for CCCs than contract centers and higher for smaller centers than medium or large centers. In our regression models of center costs per slot, we found that costs per slot for CCCs and small centers were significantly higher than for contract centers and larger centers, even after controlling for other characteristics of the centers (Appendix G). This indicates that there are some economies of scale at centers. The costs per participant were similar for medium and large centers, even though the costs per slot were higher for medium centers, because on average participants spent longer at large centers.

VII. SUMMARY OF BENEFITS AND COSTS

Taken together, the estimates we have presented of the various benefits and costs of Job Corps indicate that the program is a good social investment. Our best estimate is that Job Corps provides net benefits to society of nearly $17,000 per participant. We also compared benefits and costs from the perspective of participants, whose net benefits we estimate to average about $20,000 each, and from the perspective of the rest of society, whose net costs we estimate to be about $3,000 per participant. Benefits also exceed costs from society's perspective for most subgroups of participants.

To reach these conclusions, we had to make assumptions. To convey the degree of confidence that can be placed in our best estimate of net benefits, we examined the sensitivity of the findings to alternative assumptions. This sensitivity analysis, which deals with various sources of uncertainty, plays the role normally taken by statistical hypothesis testing or confidence interval estimation. We conclude that, despite many unknowns, the net benefits of Job Corps are positive under a wide range of plausible assumptions. While under some scenarios the net benefits are not positive, the best available data lead us to believe these scenarios to be unlikely.

Job Corps is one of the few major job training programs to have been the subject of two comprehensive studies nearly 20 years apart. By comparing the current study and its findings with the study completed in 1982, summarized by Mallar et al. (1982) and Thornton et al. (1982), we offer our assessment of how the impacts and cost-effectiveness of Job Corps have changed over time. Though the studies used different methodologies, and though the program, its target population, and the range of opportunities available to disadvantaged youth have changed, our main conclusion is that Job Corps was a cost-effective program then and is a cost-effective program now.

The rest of this chapter is organized as follows. Section A compares the overall costs and benefits from each perspective, summarizes the findings of a subgroup analysis, and discusses unmeasured benefits and costs. Sections B and C provide perspective on the study's main findings. Section B discusses the sensitivity of our benchmark estimate of the net benefits to society to alternative assumptions. Section C compares the findings of our study with those of the previous study of Job Corps. Section D provides concluding observations.

A. COMPARING OVERALL BENEFITS AND COSTS: IS JOB CORPS COST-EFFECTIVE?

A central question of the study is whether the benefits of Job Corps exceed its costs. Different segments of society realize different benefits and incur different costs, so the answer depends on whose perspective is being considered. Participants themselves realized positive net benefits from Job Corps; the rest of society incurred net costs. Yet the positive net benefits to participants far outweighed the net costs borne by the rest of society. Thus, from society's perspective overall, benefits do exceed costs. We also found that for society, benefits exceed costs for most subgroups of youth.

1. Benefits and Costs by Perspective

We compare benefits and costs from each perspective, summarizing them in Table VII.1.

a. Benefits and Costs to Society

The largest benefit to society from Job Corps was the additional output produced by participants, as measured by their earnings and fringe benefits, beyond what they would have produced in the absence of Job Corps (Figure VII.1). The benefits of additional output, however, can be realized only after students leave the program and begin working. Therefore, the "benefits" from increased output in the first year after random assignment, about -$1,700 per

TABLE VII.1

BENEFITS AND COSTS OF JOB CORPS, BY PERSPECTIVE
(1995 Dollars)

	Perspective		
Benefits or Costs	Society	Participants	Rest of Society
Benefits from Increased Output	**$27,531**	**$17,773**	**$9,758**
Year 1			
Increased Earnings and Fringe Benefits	-1,883	-1,883	0
Increased Child Care Costs	-50	-47	-4
Increased Taxes	0	309	-309
Years 2 to 4			
Increased Earnings and Fringe Benefits	2,558	2,558	0
Increased Child Care Costs	-96	-77	-19
Increased Taxes	0	-855	855
After the Observation Period			
Increased Earnings and Fringe Benefits	27,281	27,281	0
Increased Child Care Costs	-503	-398	-106
Increased Taxes	0	-9,115	9,115
Output Produced During Vocational Training in Job Corps	225	0	225
Benefits from Reduced Use of Other Programs and Services	**2,186**	**-780**	**2,966**
Reduced Use of High School	1,189	0	1,189
Reduced Use of Other Education and Training Programs	874	0	874
Reduced Use of Public Assistance and Substance AbuseTreatment Programs	122	-780	902
Benefits From Reduced Crime	**1,240**	**643**	**597**
Reduced Crime by Participants	1,240	0	1,240
Reduced Crime Against Participants	0	643	-643
Program Costs	**-14,128**	**2,361**	**-16,489**
Reported Program Operating Costs (Net of Transfers)	-12,540	0	-12,540
Unreported Program Operating Costs (Net of Transfers)	-551	0	-551
Capital Costs	-1,037	0	-1,037
Student Pay, Food, and Clothing (Transfers)	0	2,361	-2,361
Net Benefits[a]	**$16,829**	**$19,997**	**-$3,168**
Net Benefits per Dollar of Program Expenditures[b]	**2.02**		

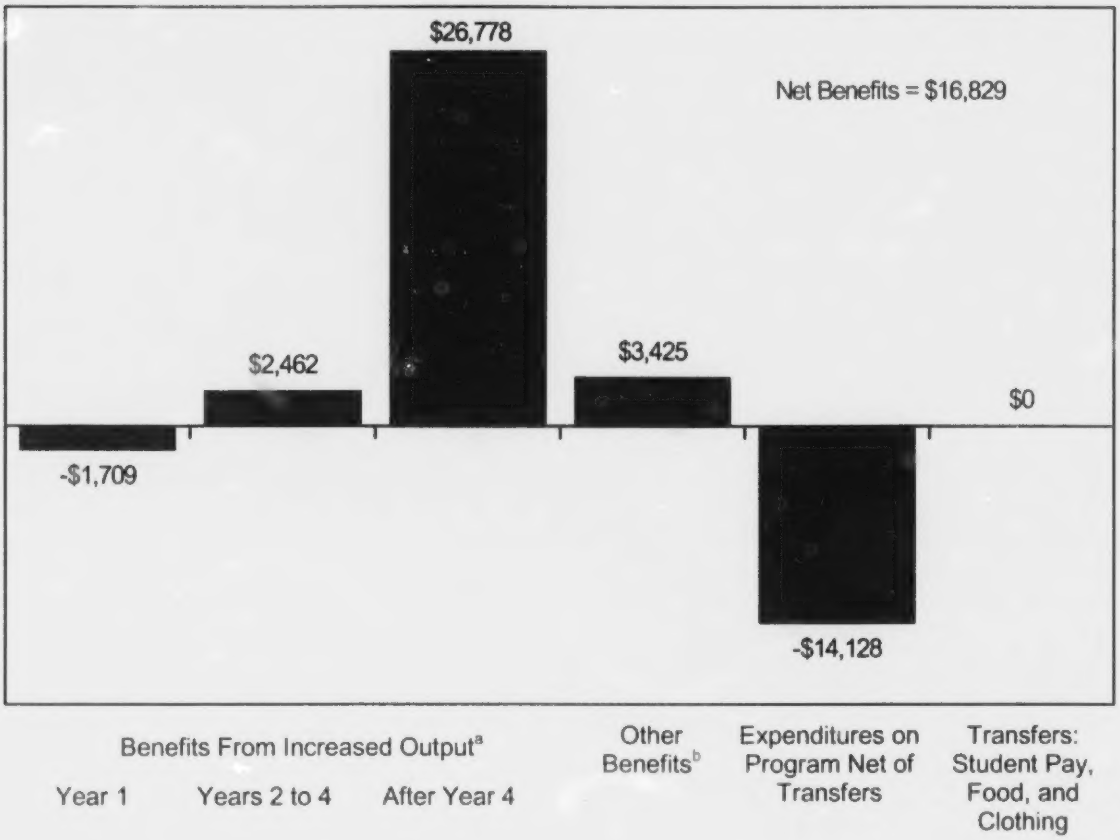
SOURCE: Tables III.7, IV.6, V.5, and VI.4

[a] Because of rounding, net benefits may not equal the sum of the rows. Similarly, benefits to society may not precisely equal the sum of the benefits to participants and the benefits to the rest of society.

[b] The ratio of benefits to costs from each perspective depends partly on arbitrary decisions, such as whether year 1 output is subtracted from benefits or added to costs, and hence it is not easily interpretable. To provide a ratio with a useful interpretation, we present the amount society gains from each dollar spent on the program. The ratio's denominator is the amount spent operating the program ($16,489). The numerator is the benefit to society ($27,531 + $2,186 + $1,240) plus the cost of student pay, food, and clothing ($2,361). The cost of student pay, food, and clothing is included in the numerator to offset the fact that it is included in the denominator even though it is not a cost to society.

FIGURE VII.1

BENEFITS AND COSTS TO SOCIETY
(1995 Dollars Per Participant)



[a] Includes earnings and fringe benefits minus child care costs. Year 1 also includes output produced during vocational training.

[b] Includes reduced use of other programs and services and reduced crime.

participant, are negative, because most participants were still in the program then. As participants left Job Corps and entered the workforce, they earned more than their counterparts who had not participated. Participants' combined output of the second, third, and fourth years after random assignment was about $2,500 more than it would have been. The dominant category of benefits, however, is the increased productivity of Job Corps participants over the remaining 40 years of their working lives, estimated to be about $26,800 per participant. The increased output produced during employment was offset by a small increased need for child care that resulted from Job Corps participants' spending more time in education and training programs and in the labor force ($650 per participant).

While the increased output represents the greatest benefit of Job Corps, society benefits in other important ways: from the reduced use of education and training programs other than Job Corps ($2,064 per participant) and from the reduced crime committed by Job Corps participants ($1,240 per participant). The remaining benefits were relatively small: the output from vocational training while participants were enrolled, the administrative cost savings of the reduced use of public assistance, and the reduced use of substance abuse treatment programs.

The large program costs reflect the fact that Job Corps is expensive to operate. The government spends about $16,500 per participant, which is about $14,900 in reported operating costs, $600 in unreported operating costs, and $1,000 in capital costs. However, about $2,400 of that amount, which is spent on student pay, food, and clothing, is a direct benefit to participants. The total cost to society is therefore just over $14,100 per participant.

Despite the high costs, the net benefit to society based on our best assumptions is large—$16,829. This means that on average, society benefits from an increase in resources equivalent to almost $17,000 for every youth it sends to Job Corps.

The results of benefit-cost analyses are often summarized as the ratio of benefits to costs. Such ratios should be interpreted with caution, however, because they depend on what is defined as a cost or benefit. The definition of each item as a cost or benefit is arbitrary and can easily be manipulated to produce different benefit-cost ratios, even while net benefits remain unchanged. For example, output per participant net of increased child care costs in year 1 (-$1,933) can be defined as a cost of Job Corps, the "forgone earnings" of participants, or an offset to the benefits. The value of reduced use of education and training programs other than Job Corps can be defined either as a benefit of Job Corps or, equivalently, as an offset to the costs. Similarly, student pay, food, and clothing can be defined as a benefit or an offset to costs. If these three line items in the benefit-cost analysis are redefined as benefits or costs, the benefit-cost ratio can be as low as 1.91 or as high as 2.39 without having any effect on net benefits. However, regardless of how benefits and costs are labeled, if net benefits are positive, the benefit-cost ratio will always be greater than one, and if net benefits are negative, the benefit-cost ratio will always be less than one.

While there is no single appropriate benefit-cost ratio, we present an estimate of the return on a dollar spent directly on the Job Corps program. Direct resources spent on the program equal the reported program costs ($14,901), the unreported program costs ($551), and the capital costs ($1,037), a total of $16,489 per participant.[1] The remaining benefits and costs to society listed in Table VII.1 can be thought of as the total "benefits" of the program. Added together, the total "benefits" are $33,318 per participant. Thus, the "benefit-cost" ratio is $33,318 divided by

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[1] We include expenditures on student pay, food, and clothing in the reported and unreported costs, because they are part of the total program expenditures needed to operate Job Corps. Recognizing that the value of these expenditures is also a benefit to participants, we also included them in the "benefits." From society's perspective, these costs and benefits offset each other, as shown in Table VII.1.

$16,489, or 2.02. That is, Job Corps returns about two dollars for every dollar spent directly on the program.

b. Benefits and Costs to Participants

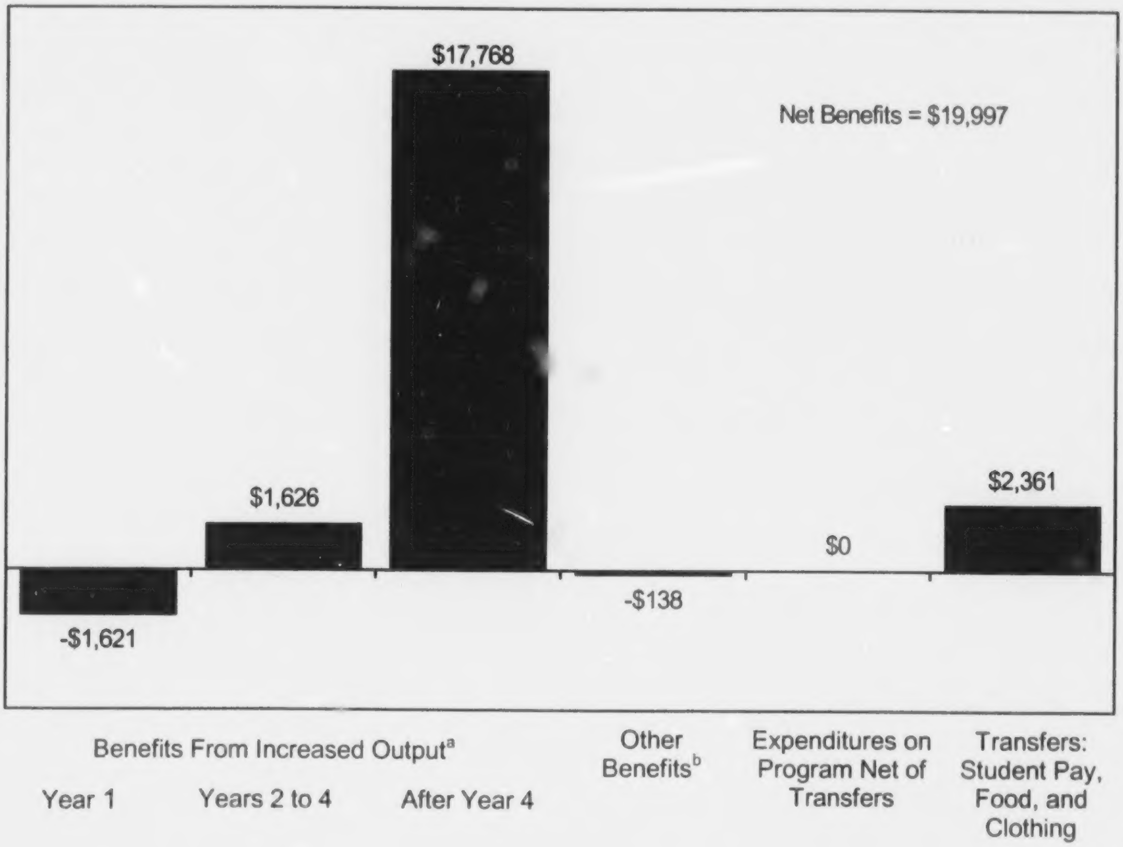
Job Corps is a very good investment for participants, who receive most of the benefits and bear little of the cost (Figure VII.2). The value of the net benefits to each participant was about $20,000 (Table VII.1), mostly in increased earnings and fringe benefits after leaving Job Corps, net of the taxes paid on those earnings and the additional child care costs that result from increased employment and training (Figure VII.2). Participants were also less likely to be victims of crime (a benefit of $643 per participant), but they also received less public assistance (a cost of $780 per participant). Although youth do not pay for Job Corps, they bear an indirect cost of participation by forgoing earnings while they are enrolled. However, the forgone earnings and fringe benefits (the reduced output in year 1) are generally offset by the value of the student pay, food, and clothing that students receive while enrolled. Thus, Job Corps yields a small net benefit to participants even if they realize no postprogram earnings gains.

c. Benefits and Costs to the Rest of Society

When viewed from the perspective of the rest of society, Job Corps is a net cost, but less than the government expenditure on the program of about $16,500 per participant might suggest (Figure VII.3). The net cost to the rest of society was only $3,168 per participant. The high program costs were offset by the increased taxes paid by Job Corps participants over their lifetime ($9,661 per participant), reduced use of education and training programs ($2,064 per participant), reduced use of various types of public assistance ($902 per participant), reduced crime against them by participants ($1,240 per participant), and *increased* crime against them

FIGURE VII.2

BENEFITS AND COSTS TO PARTICIPANTS
(1995 Dollars Per Participant)

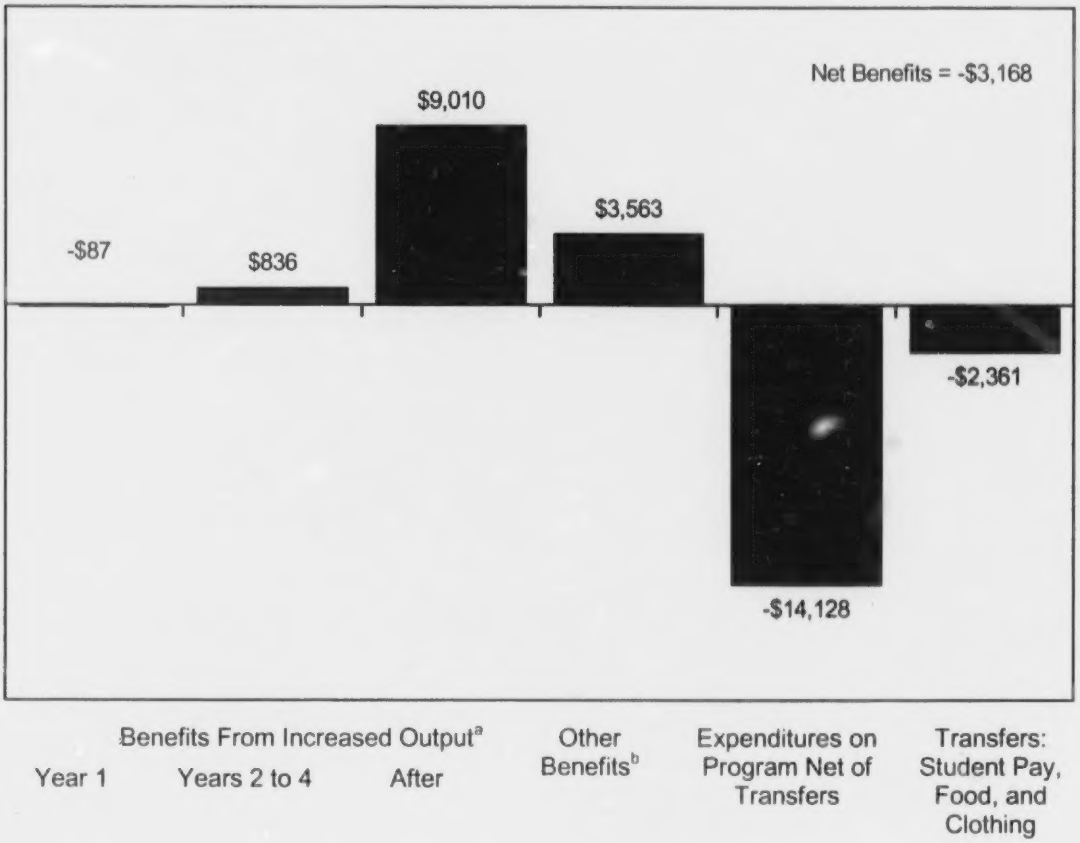


[a] Includes earnings and fringe benefits minus taxes and child care costs.

[b] Includes reduced crime committed against participants minus forgone public assistance.

FIGURE VII.3

BENEFITS AND COSTS TO THE REST OF SOCIETY
(1995 Dollars Per Participant)



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[a] Includes earnings and fringe benefits and taxes minus child care costs. Year 1 also includes output produced during vocational training.

[b] Includes reduced use of other programs and services and reduced crime.

that would have been committed against participants (-$643). Most of these benefits, shown in Figure VII.3, accrue to state, local, or federal government agencies.[2]

2. Benefits and Costs for Subgroups of Youth

The net benefits to society are positive overall. To see if this finding holds for youth who had different experiences in Job Corps, we conducted an analysis of benefits and costs for selected subgroups of youth, defined by predicted residential status and the type of center that OA counselors predicted they would attend. We found that benefits exceed costs by more than $11,500 per participant whether students were predicted to be residential or nonresidential, to attend contract centers or CCCs, or to attend small, medium, or large centers.

Our estimate of the cost-effectiveness of Job Corps for any subgroup depends primarily on whether the subgroup had large impacts on earnings in year 4, the base from which we estimated the benefits of increased output after the observation period. Except for Hispanics and youths aged 18 and 19 at random assignment, we observed impacts on year 4 earnings that were large enough for benefits to exceed costs (Schochet et al. 2001).[3] Appendix I presents a full discussion of the methodology for the subgroup analysis and presents its findings.

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[2] A small portion of the benefits, $218 per participant, accrues to private citizens and nongovernmental organizations. Private citizens bear the *victim* costs of crime: a benefit of $916 per participant from reduced crimes by participants and an offsetting cost of $643 per participant from increased crimes that would have been committed against participants (see Chapter V). They also bear a cost of $56 per participant from their share of donations and grants made to Job Corps (see Chapter VI).

[3] Benefits also do not exceed costs for nonresidential females without children. This group accounted for less than 5 percent of the sample.

3. Unmeasured Benefits and Costs

The findings of the benefit-cost analysis reflect our best understanding of the measurable benefits and costs of Job Corps. However, in any benefit-cost analysis, some benefits and costs cannot be measured precisely and are difficult to quantify objectively. Chief among them are the improvements in the quality of life for participants and their families. For example, Job Corps may make participants happier and healthier people, better citizens, better parents, and better role models for their friends and family members. We also did not measure the indirect benefits of crime reduction, such as the neighborhood improvement that accompanies a drop in crime. Data limitations made it necessary to leave out certain indirect costs, such as the value of forgone leisure that might accompany increased time spent working and training, and the full value of the capital tied up in Job Corps' land, buildings, equipment, and furniture.

B. SUMMARY OF SENSITIVITY ANALYSES

How much confidence can be placed in the summary estimate of net benefits? How confident are we that the benefits of Job Corps exceed its costs? Formal hypothesis tests of statistical significance, like those tests used in the impact analysis, can only quantify the uncertainty due to sampling variance of the impact estimates. They cannot fully capture the uncertainty faced in the benefit-cost analysis, because so much is based on assumptions, such as those for estimating the benefits after the observation period and those for appraising a reduction in crime. Our approach was to conduct sensitivity analyses, showing the net benefits of Job Corps under a wide range of alternative assumptions. The sensitivity tests are summarized here and presented in detail in Appendix B.

1. Assumptions Related to Benefits After the Observation Period

The most important assumptions that underlie the benchmark estimate are the ones related to the single largest category of benefits: the increased output of participants after the observation period. Changes in these assumptions have the largest effects on our estimates of net benefits. Specifically, we needed assumptions to address the following parameters:

- ***The Size of the Earnings Impacts.*** The benchmark used the estimated impact of Job Corps on earnings and fringe benefits in year 4, \$1,550 per participant, as a base from which to predict benefits beyond the observation period. Any errors in this impact estimate would be magnified by our procedure for using this to predict future earnings.
- ***The Time Pattern of the Earnings Impacts.*** We assume that the estimated impact on earnings and fringe benefits in year 4 continues at the same dollar amount each year. In effect, this means the impact as a percentage of earnings erodes over time, because the earnings for all workers rise with experience.
- ***The Number of Years Earnings Impacts Persist.*** The benchmark estimate is based on the assumption that impacts continue for 40 years after the observation period, until the average participant reaches age 62, when we expect them to retire.
- ***The Discount Rate.*** The benchmark estimate is based on a real discount rate of 4 percent.

One way to understand the importance of these assumptions is to vary each of them individually, holding constant all the other assumptions of the model at their benchmark conditions. Table VII.2 lists each assumption about benefits after the observation period and presents the "critical value" for each one. The critical value is the assumption that, if true, would result in an estimate of zero net benefits. If the condition is met, and all other assumptions stay at their benchmark values, then the benefits of Job Corps would exceed its costs. If the condition is not met, and all other assumptions stay at their benchmark values, ,the estimate of the net benefits of Job Corps would be negative. Benefits would not exceed costs if any of the following are true:

- The impact on earnings and fringe benefits is less than \$594 per participant in each year after the observation period.
- The impact on earnings and fringe benefits declines by 8 percent or more each year after the observation period.

TABLE VII.2

ASSUMPTIONS REQUIRED FOR BENEFITS TO EXCEED COSTS

Assumption	Benchmark Value	Critical Value for Benefits to Exceed Costs[a]
Size of the Impact on Annual Earnings plus Fringe Benefits After the Observation Period (1995 Dollars)	$1,550	$594
Time Pattern of Impact on Earnings plus Fringe Benefits After the Observation Period	Constant	Declining at 8% per year
Number of Years Impact on Earnings Persists After the Observation Period	40	9.1
Discount Rate	4%	10.5%

SOURCE: Tables B.1 and B.2, in Appendix B.

[a] If the critical value is met and all other assumptions are held constant, the benefits of Job Corps exceed its costs.

- The impacts on earnings and fringe benefits persist nine years or less after the end of the observation period
- The discount rate is 10.5 percent or higher.

Each of these conditions is unlikely. First, our best estimate of the impact on earnings and fringe benefits in the last year of the observation period was $1,550 per participant. The standard error for this estimate, which represents the statistical uncertainty of the estimate, was only $358. Thus the critical value would be outside a 95 percent confidence interval, which is about $800 to $2,300 per participant. Second, it might be plausible that the impacts of training programs decline by 8 percent or more per year if they impart narrow skills or aid in job placement only. This condition does not apply to Job Corps, however. More relevant for a youth program like Job Corps is the finding that, on average, the earnings advantage from an additional year of school does not decline over one's working lifetime. Third, while Job Corps may not pay for itself in the first 12 years after the youth leave the program, even modest impacts that continue beyond that period, when the participants are in the prime of their working careers, would lead to a positive return on society's investment. Finally, few would propose using a real discount rate that exceeds 7 percent for federal investments, so 10.5 percent would be an unrealistic standard for Job Corps.

It is quite possible that the benefits of increased output beyond the observation period may result in net benefits that are lower than the benchmark estimate of about $17,000 per participant. For example, if all estimates and assumptions are held constant but a discount rate of 7 percent (as recommended by the U.S. Office of Management and Budget) is applied, the net benefits would be only $6,000 per participant. It is also quite possible, however, for the net benefits of Job Corps to be much *larger* than the benchmark estimate. Using the discount rate of 2 percent recommended by the U.S. Congressional Budget Office (Hartman 1990), the net benefits of Job Corps would be about $30,000 per participant. Similarly, small changes in the time pattern of the earnings impacts would result in higher or lower net benefits of Job Corps. If the 12 percent impact on earnings and fringe benefits observed in year 4 continued as a constant percentage impact until participants retire at age 62, the net benefits of Job Corps would exceed $44,000 per participant.

2. Other Assumptions

The results of the benefit-cost analysis were less sensitive to the other assumptions in our analysis: those needed to estimate the benefits during the observation period (increased output in years 1 to 4, reduced crime, and reduced use of other programs and services) and those needed to estimate program costs. The key parameters were:

- ***The Size of the Impacts.*** In most cases it was straightforward to use our point estimates of program impacts per participant. The experimental design of the study ensured that these estimates would be unbiased, and the large samples ensured that most impacts were estimated precisely.

- ***The Dollar Value to Place on the Impacts.*** For those outcomes that were not directly measured in dollars, such as fringe benefits, child care, and crime, it was necessary to apply unit cost estimates from published sources.

- ***Duration of the Impacts.*** The benchmark estimates assumed that none of the benefits other than earnings and fringe benefits, taxes, and child care costs continued after the observation period. This is based on the finding that impacts on other outcomes were small at the end of the observation period.

- ***Crime Victim Replacement.*** It was not possible to determine whether the reduction in crime against participants was the result of lower crime overall in society or whether criminals that would have targeted Job Corps participants found other victims. The benchmark estimates assume that all reductions in crime against participants were offset by an equal number of crimes against other victims, an assumption of "full replacement."

- ***Program Costs per Participant.*** Most program costs were well documented, but assumptions were needed to allocate these costs to participants in a way that properly accounted for the program's normal capacity utilization and to identify those expenditures that could also be counted as direct transfers to participants.

The details of the sensitivity analyses are presented in Appendix B and summarized in Table VII.3. We found that the net benefits of Job Corps did not vary by more than $4,000 from the benchmark of $17,000 per participant as we changed these assumptions one at a time. This variation was driven primarily by the variation in our estimate of the impact of Job Corps on murder.

C. ASSESSING CHANGES IN THE BENEFITS AND COSTS OVER TIME

The current study is not the first large-scale national evaluation of Job Corps. The benefit-cost analysis Thornton et al. (1982) conducted as part of the study completed in 1982 produced estimates of the benefits and costs of Job Corps in the late 1970s, but the study differed from this one in two important ways. First, Job Corps, the populations it serves, and the context in which it operates have changed considerably. Second, the two studies used different methods. Despite these differences, both studies concluded that Job Corps is cost-effective.

TABLE VII.3

ASSUMPTIONS THAT HAVE THE LARGEST EFFECTS ON BENEFITS AND COSTS DURING THE OBSERVATION PERIOD
(1995 Dollars)

	Estimates of Net Benefit to Society (Benchmark = $16,829)	
Estimates or Assumptions Modified	Low Estimate	High Estimate
Cost of Fringe Benefits	$14,481	$16,829
Size of the Impact on Murder	13,786	19,872
Whether Victims Are Replaced in Crimes Against Participants	16,829	18,141
Whether Health Services Are Counted as Transfers	16,829	17,664
Whether Program Costs Are Adjusted for Usually Low Capacity Utilization	15,870	16,829

SOURCE: Tables B.2, B.3, and B.5 in Appendix B.

NOTE: In each row we modify only one assumption.

1. Differences in the Program and the Context in Which It Operates

Job Corps is very different from what it was in the 1970s.[4] It has grown from serving 22,000 students in 1977 to 60,000 in 1995. The fraction of nonresidential students has risen from 5 percent at the time of the earlier study to about 12 percent. A performance measurement system was instituted in the mid-1980s and has been refined continually since then. Our process study (Johnson et al. 1999) concluded that this system has successfully focused program staff efforts on the concrete goals of helping students achieve key milestones in the program, such as

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[4] The sources for this discussion are Mallar et al. (1982), Thornton et al. (1982), and Schochet (1998a).

GED completion and positive outcomes after termination. Program managers have refined curricula and teaching methods in both the academic and the vocational areas. They have also developed and instituted new curricula, such as social skills training, to address perceived student needs. Policies and procedures to hold students accountable for good behavior have been continually refined, culminating near the beginning of the study period with a strict new zero tolerance policy for drugs, alcohol and violence, which our process study found to be widely perceived as improving the climate on centers (Johnson et al. 1999). Finally, the current program serves a somewhat different group of students, who are older, more likely to be female, more likely to have a high school diploma, and less likely to have been arrested than their counterparts who enrolled in Job Corps in the late 1970s.

The employment and educational opportunities, as well as other elements of the social context, are also very different today. In the late 1970s, the national unemployment rate was around 7.5 percent; in 1995, it was 5.6 percent and declining (U.S. Bureau of Labor Statistics data, 1976-1980; 1996-1999). The set of opportunities for control group members also changed, because the array of alternative education and training programs available to youth have evolved considerably over the past 20 years.

Despite these many changes, the core elements of the Job Corps program model—academic and vocational training, primarily in a residential setting, for youth and young adults who can benefit from living away from home—have remained consistent over time.

2. Comparison of the Study Methods

The two studies employed very different methods. First, we took different approaches to measure the impacts used to estimate program benefits. Unlike this study, the 1982 study was not based on the random assignment of youth to a program or control group. Instead, a sample of Job Corps participants chosen in 1977 was compared with a matched comparison group of high school dropouts and young job seekers whose key characteristics associated with eligibility were similar to those of the Job Corps participants.[5] Statistical selection models were used to address the potential selection bias that arises in nonrandomized evaluations.

Second, the structure and timing of the data used to measure impacts in the two studies differed. The earlier study followed participants for approximately four years after they left Job Corps, while the current study followed participants for four years after *random assignment*, which took place before enrollment, at the point of eligibility determination. Because program group members could enroll at any time and leave the program at any time, the post-program part of the follow-up period varied. On average, the follow-up period included about three years of post-program observation for participants.

The assumptions and methods of the benefit-cost analysis differed as well. Most important was how the two studies estimated benefits of increased output beyond the observation period. Specifically, the following assumptions differed in the two studies:

- ***Decay of Earnings Impacts.*** Based on the best evidence available at the time, the earlier study assumed that earnings impacts decayed rapidly, to half their value five years after the end of the observation period. Operating with evidence that became available after the prior study was conducted, the current study assumed that the impact would remain constant from the end of the observation period to the time the sample members were expected to retire.
- ***Other Assumptions and Methods.*** The two studies also differed in other ways, although these made a much smaller difference in the findings. We used a lower discount rate (4 percent versus 5 percent), accounted for child care costs, used different estimates of fringe benefits, applied a different methodology for estimating the value of output produced during vocational training, followed different procedures for estimating capital costs, made different assumptions about which expenditures should be considered transfers, and made different assumptions about underreporting of crime.

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[5] The comparison group in the 1982 study was selected from lists of high school dropouts and applicants to the Employment Service from areas with low percentages of youth enrolling in Job Corps.

3. Comparison of the Findings

Because the program and the context in which it operated, as well as the methods, have changed, care is warranted when interpreting the differences between the findings of the two studies. Despite these differences, the conclusions from both studies were remarkably similar—the benefits of Job Corps exceed its costs.

Several specific findings, however, do differ between the two studies. Most important, the benefits of increased productivity, especially the increased postprogram output, are much larger in the current study (Table VII.4). The impacts on participants' earnings three years after leaving the program are remarkably similar, about \$1,200 in 1995 dollars for both studies (not shown). Thus, the difference is due mainly to assumptions about the impacts on earnings after the observation period. If in the current study we had assumed that the earnings impact would remain constant for another year (as it did in the earlier study, whose observation period included one more year of *post-program* observation) and then would decay at a rate of 16 percent until retirement, as assumed in the previous study,[6] our estimate of postprogram output would have been about \$9,500 rather than \$30,000 per participant. Under the older assumptions, which were based on the then-recent study by Ashenfelter (1978), net benefits in the current study would be negative. For reasons given in Chapter III, the more relevant evidence for predicting the time pattern of Job Corps' impacts on earnings is based on the returns to schooling.

Second, the benefits of reduced criminal activity, while still positive and substantial, were much smaller in the current study than in the earlier study, \$1,200 versus \$6,400 per participant.

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[6] The 1982 study defined "decay rate" differently. A (constant) decay rate of 14 percent in the earlier study is equivalent to an annual rate of 15.9 percent as we define it. Appendix C defines the decay rate as used in this study.

TABLE VII.4

COMPARISON OF FINDINGS FROM 1982 AND CURRENT BENEFIT-COST ANALYSES OF JOB CORPS
(1995 Dollars)

	Value to Society per Participant	
Benefits or Costs	Thornton et al. (1982)	Current Analysis
Forgone Output in Year 1	-$1,920	-$1,883
Increased Postprogram Output	7,138	29,839[a]
Increased Child Care Costs	--[b]	-650
Output Produced During Vocational Training in Job Corps	1,650	225
Reduced Use of Other Education and Training Programs	532	2,064
Reduced Use of Public Assistance and Substance Abuse Programs	443	122
Reduced Crime by Participants	6,361	1,240
Program Expenditures	-12,163	-16,489
Transfers[c]	3,035	2,361
Net Benefits[d]	**$5,071**	**$16,829**
Net Benefits per Dollar of Program Expenditures	**$1.42[e]**	**$2.02**

SOURCE: Thornton et al. (1982) and Table VII.1.

[a] We assume years 2, 3, and 4 are postprogram years for this comparison.

[b] Child care costs were not measured in Thornton et al. (1982).

[c] Transfers in the earlier study include student pay, food, clothing, and health services. In the current study, we include student pay, food, and clothing only.

[d] Net benefits may not equal the sum of the rows because of rounding error.

[e] To aid comparison between the two studies, we present the net benefits per dollar of program expenditures for both studies. The previous study used a different definition of the benefit-cost ratio and calculated a slightly higher ratio of 1.46.

The smaller benefit derives mainly from smaller estimates of the impact of Job Corps on crime, rather than from the dollar values we attached to those impacts.[7]

Third, the current study found larger benefits from the reduced use of alternative education and training programs, valued at about $500 in the 1982 study but at more than $2,000 in the current study. Fourth, the estimate of the output produced during vocational training was lower in the current study, a reflection primarily of updated methods and the exclusion of the value of projects used by Job Corps centers. Finally, program costs per participant appear to have increased since the previous study. Three factors explain the difference. The first is a methodological difference: unlike the current study, the previous study considered expenditures on health services as transfers. Second, students now spend about one and a half months (25 percent) longer in the program. Third, the costs per participant per month have risen but, interestingly, more slowly than the costs of schools nationwide (U.S Department of Education 2000).

D. CONCLUDING OBSERVATIONS

The findings from this benefit-cost analysis suggest that Job Corps is a good investment. The benefits to society exceed the costs. This finding is robust to many assumptions used in the analysis. Unavoidably, however, the finding does depend critically on the assumption that the impacts on productivity observed during the study do not decline rapidly as the participants get older. This assumption is based on what we believe to be the best available evidence. We observed no sign of decline during the observation period (Schochet et al. 2001) and no significant decline in the returns to schooling from our analysis of the long-term earnings profiles of disadvantaged youth nationally (Appendix E). However, in the coming years, it may be possible to replace these predictions about future benefits with empirical estimates of long-term impacts of Job Corps based on data from administrative records on sample members' earnings.

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[7] The earlier study, unlike the present one, assumed there was a fixed percentage of underreported crimes and therefore multiplied the estimated impacts on crime by 1.7 to account for this. No such adjustments were made in the current study. Following the method used in the 1982 study here would have raised the net benefits by $848 per participant.

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APPENDIX A

SUPPLEMENTAL TABLES

TABLE A.1

IMPACTS ON NUMBER OF HOURS OF CHILD CARE USED PER YEAR

Child Care, by Type of Provider and Year After Random Assignment	Program Group	Control Group	Estimated Impact per Eligible Applicant[a]	Estimated Impact per Participant[b]	Percentage Gain from Participation[c]
Unpaid					
1	43.6	19.8	23.9***	33.2***	219.9
2	42.1	35.7	6.4	8.9	28.4
3	50.5	46.1	4.4	6.1	15.2
4	53.9	50.9	3.0	4.2	9.4
Paid Relative					
1	38.8	24.9	13.9***	19.3***	102.1
2	39.4	41.1	-1.7	-2.3	-6.7
3	61.2	52.8	8.4*	11.7*	27.9
4	78.0	66.1	11.9*	16.5*	31.8
Paid Nonrelative					
1	9.1	9.3	-0.2	-0.2	-3.3
2	12.1	16.3	-4.2*	-5.8*	-34.6
3	21.4	25.5	-4.1	-5.7	-21.1
4	32.0	29.9	2.1	2.9	9.7
Day Care Centers					
1	26.5	20.6	5.9*	8.2*	52.0
2	37.7	36.3	1.4	1.9	6.8
3	60.1	51.2	8.9*	12.4*	34.4
4	85.3	74.0	11.3*	15.7*	25.7
Head Start					
1	0.5	0.3	0.2	0.3	635.0
2	0.8	0.6	0.2	0.3	60.1
3	1.1	1.4	-0.2	-0.3	-25.1
4	2.0	0.9	1.0	1.4	1,105.3
Employer or School					
1	0.9	1.2	-0.3	-0.4	-73.8
2	1.9	2.3	-0.4	-0.6	-28.0
3	2.2	2.2	0.0	0.0	2.4
4	1.6	1.3	0.4	0.5	47.4
Job Corps					
1	3.2	0.0	3.2***	4.5***	--[d]
2	1.5	0.0	1.5**	2.1**	--[d]
3	0.7	0.0	0.7	0.9	--[d]
4	0.0	0.0	0.0	0.0	--[d]

[a] Estimated impacts per eligible applicant are measured as the difference between the weighted means for program and control group members.

[b] Estimated impacts per Job Corps participant are measured as the estimated impact per eligible applicant divided by the difference between the proportion of program group members who enrolled in Job Corps and the proportion of control group members who enrolled in Job Corps during their three-year restriction period. Standard errors for these estimates were inflated to account for the estimation error in the Job Corps participation rate and the control group crossover rate.

TABLE A.1 *(continued)*

[c] The percentage gain from participation is measured as the estimated impact per participant divided by the difference between the mean outcome for participants and the estimated impact per participant.

[d] We cannot present the percentage gain from participation, because the denominator is zero.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE A.2

IMPACTS ON TAXES, BY QUARTER AFTER RANDOM ASSIGNMENT

Quarter After Random Assignment	Program Group	Control Group	Estimated Impact per Eligible Applicant[a]	Estimated Impact per Participant[b]	Percentage Gain from Participation[c]
1	242.4	284.7	-42.3***	-58.7***	-21.7
2	307.7	380.7	-73.0***	-101.5***	-27.7
3	372.7	436.3	-63.6***	-88.4***	-21.1
4	421.7	464.8	-43.2**	-60.0***	-13.5
5	499.6	523.7	-24.1	-33.5	-6.5
6	595.9	597.3	-1.4	-2.0	-0.3
7	678.7	650.7	28.1	39.0	6.2
8	727.0	694.6	32.3	44.9	6.6
9	772.2	731.7	40.5*	56.3*	7.8
10	801.0	743.0	58.0***	80.6***	10.8
11	867.2	785.9	81.3***	112.9***	14.6
12	919.7	829.0	90.8***	126.1***	15.4
13	965.1	876.9	88.3***	122.6***	14.0
14	999.7	912.7	87.1***	121.0***	13.4
15	1,016.9	926.7	90.3***	125.5***	13.7
16	1,021.2	914.0	107.2***	148.9***	16.7

SOURCE: Baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews.

NOTE: All estimates were calculated using sample weights to account for the sample and survey designs and interview nonresponse. Standard errors of the estimates account for design effects due to unequal weighting of the data and clustering caused by the selection of areas slated for in-person interviewing at baseline.

[a] Estimated impacts per eligible applicant are measured as the difference between the weighted means for program and control group members.

[b] Estimated impacts per Job Corps participant are measured as the estimated impact per eligible applicant divided by the difference between the proportion of program group members who enrolled in Job Corps and the proportion of control group members who enrolled in Job Corps during their three-year restriction period. Standard errors for these estimates were inflated to account for the estimation error in the Job Corps participation rate and the control group crossover rate.

[c] The percentage gain from participation is measured as the estimated impact per participant divided by the difference between the mean outcome for participants and the estimated impact per participant.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE A.3

AVERAGE REPORTED PROGRAM OPERATING COSTS FOR RESEARCH SAMPLE PARTICIPANTS

(1995 Dollars)

Component	Per Slot-Year	Per Participant-Year	Per Participant
Costs Incurred by the Centers			
Academic Instruction	$1,641	$1,681	$1,041
Vocational Training	3,008	3,088	1,925
Counseling, Residential Advisors, and Other Instruction	4,773	4,924	3,047
Support Services			
Food[a]	1,098	1,134	701
Clothing	363	373	230
Other[b]	1,847	1,888	1,174
Health Services	1,306	1,344	834
Center Administration	3,728	3,816	2,368
Center Capital Expenses	680	701	431
Total Operating Costs Incurred by the Centers	**18,444**	**18,950**	**11,752**
Centralized Costs			
Student Pay	2,111	2,286	1,427
Outreach, Admissions, and Placement	1,669	1,712	1,062
Non-local Transportation	326	364	223
National and Regional Office Support	365	375	232
Other	317	325	202
Total Centralized Costs	**4,789**	**4,909**	**3,147**
Total[c]	$23,233	$23,858	$14,898

SOURCE: National Office of Job Corps.

[a] Includes only the cost of purchasing food ingredients. It does not include the costs of preparing the food.

[b] Includes the costs of preparing food, laundry service, local transportation, and any child care provided on center.

[c] Because of rounding, the totals may not equal the sum of the rows.

APPENDIX B

SENSITIVITY ANALYSES

Benefit-cost analysis requires many assumptions to convert all the impacts of Job Corps into dollar values. With all these assumptions, traditional hypothesis testing and confidence interval estimation based on statistical significance would be misleading, because those methods account only for variation due to sampling variance. Instead, we conduct sensitivity analyses, in which we examine the effect of changing assumptions on the estimate of benefits net of costs. In each sensitivity analysis, only one assumption at a time is changed; all the other benchmark assumptions are unchanged.

This appendix presents the results of these sensitivity analyses. We begin in Section A by presenting the effect of changes in the discount rate on our estimates of net benefits. In each of the remaining sections, we present the sensitivity analyses for the assumptions required to estimate, respectively, the benefits from increased output, the benefits from the reduced use of other programs and services, the benefits from reduced crime, and the program costs.

A. ASSUMPTIONS ABOUT THE DISCOUNT RATE

A key parameter in the benefit-cost analysis is the discount rate. As we discussed in Chapter II, we used a discount rate of 4 percent. Others have proposed discount rates as low as 2 percent and as high as 7 percent. Table B.1 shows the estimates of net benefits to society under alternative discount rates. The benchmark assumption in this and all subsequent tables is presented in bold italic for comparison.

Changing the discount rate has a large effect on the size of estimated net benefits, but benefits exceed costs under all reasonable discount rates. If we used a discount rate of 2 percent, the net benefits would be nearly $30,000 per participant (Table B.1). If we used a discount rate of 7 percent, the net benefits would be only about $6,000 per participant. Our estimate of the net benefits of Job Corps is always positive, as long as the discount rate is less than 10.5 percent and we hold all other assumptions at their benchmark value.

TABLE B.1

BENEFITS AND COSTS TO SOCIETY
UNDER ALTERNATIVE DISCOUNT RATES
(1995 Dollars)

Discount Rate	Net Benefits per Participant	Difference from Benchmark
2.0%	$29,592	+$12,763
4.0%	***16,829***	***0***
7.0%	6,289	-10,539
10.5%	0	-16,829

NOTE: Benchmark assumptions are shown in bold italic. In each row we change only one assumption.

B. ASSUMPTIONS ABOUT BENEFITS FROM INCREASED OUTPUT

Sèveral assumptions were necessary for estimation of the value of the increased output of Job Corps participants both during and after the observation period. These assumptions, and the sensitivity of our results to changes in them, are presented in Table B.2 and discussed in the rest of this section. We found that our estimate of net benefits was very sensitive to the assumptions about benefits from increased output after the observation period; it requires that the impacts observed during the observation period persist without decaying rapidly for at least another nine years. The findings are far less sensitive to assumptions about benefits during the observation period.

1. Assumptions Required for Estimation of the Increased Output After the Observation Period

Most of the increase in output from Job Corps occurs after the observation period. Because these benefits are so large and are not directly observed, the assumptions required to estimate them are extremely important and have a large effect on the estimate of net benefits. The estimate of these benefits depends on four assumptions: (1) the discount rate, (2) the size of the

TABLE B.2

BENEFITS TO SOCIETY FROM INCREASED OUTPUT UNDER SELECTED ALTERNATIVE ASSUMPTIONS
(1995 Dollars)

Assumption	Benefit from Increased Output[a]	Net Benefits	Difference from Benchmark
Benchmark	***$27,531***	***$16,829***	***$0***
Size of the Impact on Annual Earnings and Fringe Benefits After the Observation Period			
$2,267 year 4 impact estimate plus 2 times its standard error	40,139	29,437	+12,608
$1,658 quarter 16 impact estimate	29,424	18,721	+1,892
$1,550 year 4 impact estimate	***27,531***	***16,829***	***0***
$834 year 4 impact estimate minus 2 times its standard error	14,925	4,222	-12,607
$594	10,702	0	-16,829
Time Pattern of Impact on Earnings After the Observation Period			
Constant percentage impact[b] (impact = 12%)	54,870	44,167	+27,339
Constant dollar impact (impact = $1,550)	***27,531***	***16,829***	***0***
Declining dollar impact (decay rate = 8.0%)	10,702	0	-16,829
Declining dollar impact (decay rate = 15.9%)	6,074	-4,629	-21,457
Number of Years Impact on Earnings After Observation Period			
43.0 (retirement at age 65)	28,328	17,625	+797
40.0 (retirement at age 62)	***27,531***	***16,829***	***0***
33.0 (retirement at age 55)	25,265	14,562	-2,267
9.1	10,702	0	-16,829
Cost of Fringe Benefits (as Percentage of Earnings)			
20.3% for program group; 19.9% for control group[c]	***27,531***	***16,829***	***0***
17% for both program and control group members	25,184	14,481	-2,347
Cost of Unpaid Child Care			
$ 0	***27,531***	***16,829***	***0***
$ 1.55 per hour	27,412	16,710	-117

NOTE: The benchmark assumptions are in bold italic. In each row we change only one assumption.

[a] Includes increased child care costs and value of output produced during vocational training.

[b] We assume that control group members' earnings increase each year by [8.1 - 0.24(N-1)] percent, where N is the number of years since random assignment.

[c] These are the average costs of fringe benefits. Fringe benefits for the program group members are assumed to cost 20.1 percent of earnings in quarters 1 to 4, 20.6 percent of earnings in quarters 5 to 10, and 20.1 percent of earnings in quarters 11 and later. Fringe benefits for the control group members are assumed to cost 20.1 percent of earnings in quarters 1 to 4, 20.1 percent of earnings in quarters 5 to 10, and 19.5 percent of earnings in quarters 11 and later.

impact that is assumed to persist after the observation period, (3) how the impact does or does not change over time after the observation period, and (4) the length of time the impact persists after the end of the observation period. We discussed the discount rate in the previous section. We discuss the other three assumptions in this section.

a. Size of the Earnings Impacts

Our benchmark estimates assume that the impact on compensation (earnings plus fringe benefits) in each year after the observation period is equal to the impact in year 4 ($1,550 per participant). We used the impact from the last year of the observation period rather than the last quarter because annual impacts are less likely to be affected by random fluctuations. If instead we assumed that the impact on annual compensation based on the last *quarter* of the observation period persisted at its value of $1,658 per participant, the value of total increased output over the participant's lifetime would be about $2,000 higher than our benchmark estimate.

Although the estimate of the year 4 impact on compensation is unbiased, random estimation error could cause it to differ from the true impact of Job Corps. To assess the extent to which random estimation error could affect the results, we calculated the value of increased output under the alternative assumptions that the year 4 impact was two standard errors above the point estimate or two standard errors below it. These points mark the ends of an approximate 95 percent confidence interval. This means that the probability that the true impact will lie between these bounds, roughly $800 and $2,300 per participant, is about 95 percent. We found that random estimation error could change our estimates by about $13,000 per participant, resulting in estimates of net benefits as low as $4,200 per participant or as high as $29,400 per participant (Table B.2). Retaining all the other benchmark assumptions, the impact in each year would have to be below $594 per participant for net benefits to be negative. This appears highly unlikely, given our impact estimates.

b. Time Pattern of the Earnings Impacts

Assumptions about how the impact varies over time are key to the estimation of the benefit after the observation period. Our benchmark assumption is that the *dollar* value of the impact remains the same every year until retirement. Alternatively, if we allow the dollar value of the impact to decay over time, as suggested by some studies of the returns to training, the estimated value of the increased output would be significantly lower than our benchmark. For example, if we assume that it declines by 15.9 percent per year, consistent with the findings of long-term impacts for males taking MDTA classroom training in 1964 (Ashenfelter 1978), our estimate of net benefits becomes negative.

One way to characterize the hypothesis that the gap grows larger between participants and their counterparts who would have participated is to assume that the impact as a *percentage* of earnings is the same or increasing every year. Since earnings would likely rise with experience even in the absence of Job Corps, a constant percentage impact on earnings would be equivalent to a dollar value impact that is rising over time. If the impact on earnings of 12 percent observed in year 4 were to persist at 12 percent every year, the net benefits of Job Corps would be more than $44,000 per participant.[1] However, if the proportionate impact began at 12 percent and fell by 1.1 percentage points a year until it reached zero, as suggested by the Lillard and Tan (1992) study of the returns to private sector training, the net benefits would be negative (not shown).

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[1] This assumes that in the absence of Job Corps, earnings would increase each year by [8.1 – 0.24(N-1)] percent, where N is the number of years since random assignment.

c. Number of Years Earnings Impacts Persist

Our benchmark assumption is that the impact on earnings plus fringe benefits persists for 40 years, an estimate of the time remaining in the youths' working lives assuming they retire at age 62. The estimate of the value of the increased output is fairly robust to small changes in the length of time the impacts are assumed to persist, because the impacts occurring later are heavily discounted. For example, assuming a retirement age of 55 instead of 62 would reduce the time earnings persist from 40 to 33 years, and would reduce estimated net benefits by about $2,300 per participant. Allowing the retirement age to be 65 would raise the net benefit estimate by about $800 per participant. Benefits must persist for at least nine years after the observation period for net benefits to be positive.

2. Other Assumptions Used to Estimate the Value of Increased Output

To estimate the value of increased output, we also needed to make assumptions about the cost of fringe benefits and the cost of unpaid child care. The sensitivity analysis shows, however, that our findings are fairly robust to alternative assumptions about these two components of output.

- ***Cost of Fringe Benefits.*** Our benchmark estimates took into account that program group members were more likely than control group members to receive health insurance and retirement benefits. Deriving these estimates, however, required assumptions about the cost of health insurance and retirement benefits as a percentage of earnings. If instead we took a simpler approach and assumed that the cost of fringe benefits for both program and control group members was the same and only 17 percent of earnings—the cost of fringe benefits for part-time workers in 1999 (Bureau of Labor Statistics 2000)—net benefits fall by only about $2,400 per participant. Even if we assume no fringe benefits, the scenario most unfavorable to Job Corps, net benefits are $10,756 per participant (not shown).
- ***Cost of Unpaid Child Care.*** When estimating the cost of child care, we assumed that unpaid child care does not impose a cost on society. If, however, unpaid child care providers forgo productive activities to care for children, then it would impose a cost. However, we find that the value of increased output falls by only $117 per participant

even if we assume that unpaid child care costs society $1.55 per hour, the average cost of paid child care provided by a relative.

C. ASSUMPTIONS ABOUT THE BENEFITS OF THE REDUCED USE OF OTHER PROGRAMS AND SERVICES

Society benefits from the reduced use of programs and services other than Job Corps. Most of this benefit is a result of the reduction in attendance at high school, with the reduced use of other education and training programs, such as GED preparation or trade school, making up most of the rest. It also includes a small benefit from the reduction in the use of public assistance and substance abuse treatment programs.

We found that our estimate of the net benefits to society changed little with changes in the key assumptions. Using plausible alternatives to our benchmark assumptions, the benefits from reduced use of programs and services could be about $300 higher or lower than the benchmark (Table B.3). This range of difference is small compared to the costs of the program and the benefits of increased output. The results of the sensitivity analyses of the benefits from the reduced use of other programs are summarized below:

- ***Size of the Impact on High School.*** Of all programs and services, Job Corps has the largest impact on attendance at high school. Under the assumption that the true impact of Job Corps on attendance at high school was two standard errors away from the point estimate, and hence approximately at either end of the confidence interval of the estimate, the total benefit from the reduced use of other programs and services increases or decreases by about $200.

- ***Cost of High School.*** Our estimate of the cost of high school relied on three assumptions, which we change in this sensitivity analysis. First, we assumed that the cost of high school was 23 percent higher than the average cost of all schools. Making the extreme assumption that high school is no more costly than other schools reduces the total benefit from the reduced used of other programs by only about $200. Second, we assume that costs for a disadvantaged youth in our sample to attend high school are the same as for an average student. We show that even if it cost 25 percent more for a member of our sample to attend high school, total benefits would increase by only $300. Finally, we assume that half the capital expenditures are used to renovate existing schools rather than to expand the school system. Removing all

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TABLE B.3

BENEFITS TO SOCIETY FROM REDUCED USE OF OTHER PROGRAMS AND SERVICES UNDER SELECTED ALTERNATIVE ASSUMPTIONS[a]

(1995 Dollars)

Assumption	Benefits from Reduced Use of Programs and Services	Net Benefits	Difference from Benchmark
Benchmark	***$2,186***	***$16,829***	***$0***
Impact on Hours Attended High School			
Impact = point estimate minus 2 times its standard error	2,389	17,032	+203
Impact = point estimate	***2,186***	***16,829***	***0***
Impact = point estimate plus 2 times its standard error	1,983	16,626	-203
Cost of High School per Hour[a]			
$8.01 (25 percent higher than the benchmark)	2,484	17,127	+298
$6.41	***2,186***	***16,829***	***0***
$5.99 (excludes capital expenditures)	2,108	16,751	-78
$5.21 (average cost of elementary and secondary schools)	1,963	16,606	-223
Persistence of Impacts			
Benefits from the reduced use of public assistance persist after the observation period, with an annual decay rate of 20 percent	2,246	16,886	+60[b]
No benefits after the observation period	***2,186***	***16,829***	***0***

NOTE: The benchmark assumptions are in bold italic. In each row we change only one assumption.

[a] Averaged over years 1 to 4.

[b] The participants lose an additional $491, and the rest of society benefits from an additional $551.

capital expenditures from our estimate of the cost of high school reduces societal benefits by less than $100.

- ***Benefits from the Reduced Use of Public Assistance After the Observation Period.*** We assume that the benefits from the reduced use of public assistance do not continue beyond the end of the observation period. However, as the impact on the amount of public assistance received is still positive and statistically significant in year 4, a benefit from the reduced use of public assistance may persist after the observation period. If the reductions in the receipt of public assistance persist after the observation period but decline by 20 percent each year (about the rate of change observed during the last three years of the observation period), net benefits would increase by about $60 per participant, the amount by which the administrative costs would fall. However, the total benefits to the government (the rest of society) would increase by more than $500, and the value of benefits to participants would fall by just less than $500.

D. ASSUMPTIONS ABOUT THE BENEFITS OF REDUCED CRIME

It is especially difficult to place a dollar value on reductions in crime. We examined the sensitivity of our estimates to assumptions affecting the following four parameters: (1) the size of the impact estimates, (2) the number of victimizations per arrest by type of offense, (3) the costs per crime borne by the Criminal Justice System (CJS) and by victims, and (4) whether reduced crime against participants was a net reduction in crime in society or whether the offenders found other victims. Table B.4 presents findings from these sensitivity analyses. The sensitivity tests show that the benefits of reduced crime could be as much as $3,000 higher or lower than the benchmark estimates.

1. Impact Estimates

The first key assumption is that our point estimates of the experimental impacts represent true program effects. Even with the very large samples available for this analysis, the frequencies of rare events like rape and murder are difficult to estimate precisely, and a few reporting errors or other chance events can introduce error into the impact estimate. To test the

TABLE B.4

BENEFITS TO SOCIETY FROM REDUCED CRIME UNDER SELECTED ALTERNATIVE ASSUMPTIONS
(1995 Dollars)

	Total Benefit from Reduced Crime	Net Benefits	Difference from Benchmark
Benchmark	***$1,240***	***$16,829***	***$0***
Impact on Murder			
Impact = point estimate plus 2 times its standard error	-1,803	13,786	-3,043
Impact = 0	647	16,236	-593
Impact = point estimate	***1,240***	***16,829***	***0***
Impact = point estimate minus 2 times its standard error	4,283	19,872	+3,043
Victimizations per Arrest			
One victimization per arrest	751	16,339	-489
Multiple victimizations per arrest, based on data from Job Corps interview[a]	1,000	16,589	-240
Multiple victimizations per arrest, based on published data	***1,240***	***16,829***	***0***
Cost of Prison[b]			
$46 per Day	***1,240***	***16,829***	***0***
$60 per Day	1,377	16,966	+137
Reduced Crime Against Participants			
Victims are replaced[c]	***1,240***	***16,829***	***0***
Victims are not replaced	2,392	17,980	+1,152
Victims are not replaced, murder included[d]	2,552	18,141	+1,312

NOTES: The benchmark assumptions are in bold italic. In each row we change only one assumption.

[a] Benchmark values replaced for robbery, burglary, motor vehicle theft, larceny, and assault only.

[b] Benchmark values replaced for murder, aggravated assault, robbery, burglary, and drug law violations only.

[c] If victims are replaced, then crimes committed against participants are assumed to be offset by the same crimes being committed against others.

[d] Impacts on murders of participants are not counted in the benchmark estimates, because they were not measured directly. Estimates that include murder are based on an indirect measure, the impact on participant deaths.

sensitivity of the findings to estimation error in these impact estimates, we computed the benefits of Job Corps using the endpoints of a statistical confidence interval that represents the range in which we can be fairly certain the true impact lies. We conducted the test separately for each of the crimes measured in this study, although the results were most sensitive to murder, rape, and arson, where the crimes were rare and the victim and CJS costs were very high.

While the three serious, rare crimes just mentioned were important, only variations in the estimate of murder had an appreciable influence on the overall net benefits of Job Corps. Table B.4 presents estimates of the benefit to society of reduced crime if we assume that the true impact of Job Corps on murder was equal to the estimates reported by Schochet et al. (2001). This is the benchmark assumption. We also present benefits that result if we assume that the true impact was higher (more murders committed by participants) by two times the standard error, lower by two times the standard error, or equal to zero. The estimated net benefits from Job Corps vary by about $3,000 with these changes in the impact on murder. These estimates, however, are not all equally plausible. The lower-bound estimate represents a scenario in which Job Corps *increases* the murder rate by almost 3 arrests per 1,000 participants. If there is no impact our estimate of net benefits per participant would be about $600 lower than the benchmark.

2. Victimizations per Arrest

Our method required a second assumption for estimating the impact of Job Corps on crime victimization. Our benchmark estimates are based on the belief that the most accurate way to measure the impact on victimization is to multiply the impact on *arrest* charges by a factor that expresses the number of victimizations per arrest, including those victimizations that never resulted in an arrest. Furthermore, our benchmark estimate used a ratio of victimizations per arrest for each offense type based on federal crime statistics.

Even if we assume that there is only one victimization per arrest, and thus count only offenses that resulted in arrest, the benefit to society of reduced victimization would be $416 per participant, almost half the benchmark estimate, and the net benefits would be less than $500 below the benchmark.

Another alternative is to adjust the arrest impacts using the self-reported data from the follow-up interviews on the number of illegal acts committed by participants. The average number of criminal acts per arrest can be calculated directly from the data by dividing the number of criminal acts by the number of times sample members were arrested and charged with that crime. The resulting victimization rates were comparable, though often slightly lower than those derived from federal statistics. The estimate of net benefits based on victimization rates from self-reported data was $240 lower than the benchmark. Much of this difference comes from the lower number of incidents per arrest for burglary, which was 4.3 based on interview data and 14.6 based on published federal statistics.

One reason that victimization rates based on the Job Corps survey might be lower than those derived from federal statistics could be that offenders are more likely than victims to underreport criminal activity. Other reasons that the two sources differ could be related to the way questions were asked and the time period they focused on. Details of these methods are provided in Appendix F.

3. Social Costs per Crime

Another source of uncertainty is the cost per crime. Because the cost of murder is so large, it is particularly important. For both the CJS and the victim cost components, we used the best available information and did not include components that are too difficult to quantify objectively, such as the value of human life. Instead, we left those components of the cost savings as unmeasured benefits. For the other crimes, the most important component was the cost of prison sentences, which was weighted by the probability of serving time in prison and the average sentence served. The benchmark estimates are based on social costs where the cost of a day in prison was about $46.[2] Alternative estimates place the value at $60 per day or even higher.[3] If we assume prison costs to be $60 per day, net benefits would be about $140 higher per participant. Varying the cost of crime in other ways not shown here, such as relying on different published sources, had similar effects, raising or lowering the benefits by small amounts.

4. Crime Against Participants

A key assumption about the crimes committed against participants was that such crimes were not eliminated, but were merely shifted to other victims. This assumption implies "full replacement of victims," where no change in the total amount of crime occurs. An alternative assumption would be that no replacement of victims occurs; instead, taking a Job Corps participant out of a situation in which he or she is victimized prevents the crime altogether. This may be a plausible assumption for crimes like domestic violence or assault, where the victim is known to the offender, but it is less plausible for others, like auto theft and burglary. For still other crimes, like assault, some victimizations may involve replacement while others do not.

When averaged over all offense types, the true amount of crime prevented probably lies somewhere between the extremes of full replacement and no replacement. The benefits associated with these two assumptions serve as useful endpoints of the range, because if any crime is not replaced, then its reduction represents a net benefit to society and would be accompanied by a reduction in CJS costs as well.[4] The benchmark estimate of $1,240 per participant assumes full replacement. If no replacement is assumed, the estimate of benefits to society would rise by about $650 from reduced victim costs, and $500 from reduced CJS costs. Thus, the net benefits would increase by over $1,100 if we assumed no replacement instead of the full replacement assumed for the benchmark estimate.

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[2] The actual figure was a weighted average from four different jurisdictions and was allowed to vary with the type of crime.

[3] The range of cost estimates for each crime and for each component of crime, including prison, are documented in Appendix F.

A key offense that was missing from the analysis of crimes against participants was murder. Job Corps probably reduced the likelihood that participants would be murdered, because, for example, it removed some youths from an environment dominated by violent gangs and placed them in the protective surroundings of a Job Corps center. If so, it would be important at least to recognize this contribution of Job Corps to the improvement in youth's lives, and perhaps also to society, if we assume that another youth would not have been killed in the participant's place.

Unfortunately, while we know which sample members died, it was not possible to collect data systematically on the causes of death. Anecdotal evidence from survey staff, however, was available, and suggests that the causes were split roughly evenly among crime, health, and accidents. If we assume that one-third of the impact on *deaths* of Job Corps participants was an impact on *murders,* the total benefit from the reduction in crime against participants would be only $160 higher than the estimate that excludes murder (Table B.4).[5] This also assumes that reductions in murder committed against participants are not replaced by increases in murder committed against others, and includes the CJS cost associated with those murderers that are eventually arrested.

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[4] We estimate reduced CJS costs using the same conversion factors of victimizations per arrest for each crime type used in the analysis of crimes committed by participants.

[5] Estimates of the impact on participant deaths and on participants' probability of being murdered are presented in Appendix F.

E. ASSUMPTIONS USED TO ESTIMATE PROGRAM COSTS

Estimating costs required three main assumptions: (1) that capacity underutilization in PY 1994 and PY 1995 was temporary and did not affect the benefits from the program, (2) that average capital expenditures on the rehabilitation and relocation of centers between PY 1991 and PY 1998 was a good estimate of the amount that capital depreciates each year, and (3) that only student pay and expenditures on food and clothing are transfers. Replacing any one of these assumptions with a reasonable alternative does not make a large difference to our cost estimates, changing them by less than $1,000 per participant (Table B.5). The three sensitivity tests are summarized below:

1. ***Adjusting for Unusually Low Capacity Utilization.*** Our benchmark estimates assume that the capacity utilization of Job Corps in PY 1994 and PY 1995 was at the PY 1993-PY 1996 average rate. If instead we used the actual capacity utilization to calculate costs in those years, our estimate of net benefits decrease by nearly $1,000.
2. ***Capital Costs.*** Our benchmark estimate of capital costs was the average of expenditures on center rehabilitation and relocation from PY 1991 to PY 1998. If instead we use the average expenditures on center rehabilitation and relocation over the years of our study (PY 1994 to PY 1996), the estimate of capital costs increases by just $300. Including the average expenditures on the acquisition of new centers from PY 1991 to PY 1998, our estimate of net benefits would be about $500 lower.
3. ***Transfers.*** Our benchmark estimate was based on the assumption that only student pay and expenditures on food and clothing were transfers. If we also included expenditures on medical and dental services as transfers, the estimate of net benefits would be about $800 more than the benchmark.

TABLE B.5

PROGRAM COSTS TO SOCIETY UNDER SELECTED ALTERNATIVE ASSUMPTIONS
(1995 Dollars)

Assumption	Program Cost to Society per Participant	Net Benefits to Society	Difference from Benchmark
Benchmark	***$14,128***	***$16,829***	***$0***
Capacity Utilization			
Not adjusted for capacity underutilization	15,087	15,870	-959
Adjusted for capacity underutilization	***14,128***	***16,829***	***0***
Capital Costs			
Average costs of new centers, rehabilitation, and relocation costs PY 1991 to PY 1998	14,583	16,374	-455
Average rehabilitation and relocation costs PY 1994 to PY 1996	14,423	16,534	-295
Average rehabilitation and relocation costs PY 1991 to PY 1998	***14,128***	***16,829***	***0***
Transfers			
Student pay, food, and clothing	***14,128***	***16,829***	***0***
Student pay, food, clothing, and health services	13,293	17,664	+835

NOTE: The benchmark assumptions are in bold italic. In each row we change only one assumption.

APPENDIX C

DISCOUNTING AND EXTRAPOLATION APPROACH

While most of the costs of Job Corps occur while the youth is participating in the program, some of the benefits of the program may occur many years later. Indeed, we expect some benefits to persist well after the end of the study observation period. This appendix describes how we discounted benefits that occurred after the first year of the observation period and how we estimated the value of the benefits that we expect to occur after the observation period.

A. ESTIMATING THE DISCOUNTED VALUE OF BENEFITS IN THE OBSERVATION PERIOD

We calculated the total benefits that occurred in the four-year study observation period by discounting the benefits that occur after the first year of the observation period. The formula we used to estimate these benefits was:

$$\sum_{i=1}^{4} \frac{B_i}{(1+r)^{i-1}}$$

where i is the number of years since random assignment, r is the real discount rate, and B_i is the benefit in year i. Under our benchmark assumption, r is equal to 0.04.

B. ESTIMATING THE BENEFITS THAT OCCUR AFTER THE OBSERVATION PERIOD

While we did not attempt to measure the benefits from most impacts of Job Corps after the observation period, we did estimate the benefits from the increased earnings and taxes, benefits that we expect to occur after the end of the observation period. We also estimated the increased child care costs that we expect to occur after the end of the observation period.

1. Extrapolating the Benefits from Increased Earnings and Taxes

We used the same approach to estimate the benefits after the observation period of both increased earnings and increased taxes. For each type of benefit, we calculated the total discounted benefit after the observation period by:

$$B \sum_{i=5}^{T} \frac{(1-\delta)^{i-4}}{(1+r)^{i-1}}$$

where B is the observed benefit that is the basis for the extrapolation, T is the number of years after random assignment that the benefits are assumed to persist, r is the discount rate, and δ is the rate at which the benefits decline each year.

Our benchmark estimate was based on the assumption that the impact on earnings and the impact on taxes observed in the *last year* of the observation period continued after the observation period. Hence, under our benchmark assumptions, B is the estimated impact on earnings and fringe benefits in the fourth year of the observation period ($1,550) or the estimated impact on taxes in the fourth year of the observation period ($518). We assumed that the impact on earnings and taxes will persist for the rest of the sample members' working lives. As the average age of our sample members is 22 at the end of the observation period, our assumption that they will retire at 62 implies that the benefit will persist for another 40 years after the end of the observation period. T, the number of years since random assignment, is equal to 44.

Under our benchmark assumptions, we assumed that the dollar value of the impact on earnings and taxes did not decline throughout the sample members' working lifetime. Hence under our benchmark assumption, δ is zero. In Appendix B, we show how estimated benefits vary when we allow the impacts to decline each year and δ *is* greater than zero.

2. Extrapolating Child Care Costs

Just as we expect the impacts on earnings to persist beyond the observation period, we also expect the impacts on child care costs to persist. However, it would be unrealistic to expect that the impacts on the use of child care persist for the rest of the sample members' working lives, because the need for child care decreases as children get older. Using the 1999 Current Population Survey, we estimated that about 49 percent of 22-year-old women without a college degree have children under six. This percentage increases by about 8 percent for each additional year of age until it peaks at 62 percent for 25-year-old women. This percentage then decreases by about 13.5 percent for each additional year of age. We assumed that the impacts on child care costs follow a similar pattern: They increase in magnitude by about 8 percent a year for three years after the end of the observation period (when the average age of the sample members is 22). The impacts are then assumed to decay at a rate of 13.5 percent per year.

We estimated the child care costs after the observation period using the following formula:

$$B\left[\sum_{i=5}^{7}\frac{(1+\delta_1)^{i-4}}{(1+r)^{i-1}}+\left(1+\delta_1\right)^3\sum_{i=8}^{T}\frac{(1-\delta_2)^{i-7}}{(1+r)^{i-1}}\right]$$

Under our benchmark assumptions, B is equal to the estimated increase in child care costs in the last year of the observation period ($82). The first term inside the square bracket is the estimated cost of child care for the first three years after the end of the observation period, when child care costs are increasing by 8 percent, so δ_1 is equal to 0.08. The second term inside the square bracket is the estimated cost of child care from the eighth year after random assignment until retirement, and δ_2 is equal to 0.135. T, the number of years the benefits are assumed to persist after random assignment, is 44.

APPENDIX D

ESTIMATION OF THE COST OF FRINGE BENEFITS

The most important benefit of Job Corps is the increased output of its participants. We measured the output of our sample members using the amount that employers are willing to pay for their work. This includes not only earnings, but also the amount the employers spend on fringe benefits. This appendix describes the methodology used to estimate the cost to the employer of fringe benefits offered to members of our research sample.

A. APPROACH

Our goal was to estimate the average cost of fringe benefits over all workers in our program and control groups. However, we did not collect information from our sample members on the cost of fringe benefits. And, unfortunately, no national data are available on the cost of fringe benefits to low-income workers. Hence, we estimated the cost based on national data on the cost of fringe benefits and survey data on the proportion of our sample who were offered fringe benefits.

The average cost of a fringe benefit for a group of workers (which we denote α) depends on two factors: (1) the proportion of the group who are offered the benefit (which we denote λ), and (2) the average cost of the benefit for those who are offered the benefit (which we denote β). We have survey data on the proportion of the program and control group who were offered each benefit. However, we do not have survey data on the average cost of the benefit. So we assumed that the cost of each fringe benefit as a percentage of average earnings is the same as the national average cost of the benefit as a percentage of average earnings. As the amount and quality of fringe benefits offered increases with earnings, this is a more reasonable than assuming that the *dollar* cost of fringe benefits for members of our research sample was the same as the national average *dollar* cost of the benefits.

B. NATIONAL ESTIMATES OF THE COST OF FRINGE BENEFITS

National data on the cost of fringe benefits for those offered the benefits (β) are not collected directly. However, the Bureau of Labor Statistics (BLS) does collect data on the cost of fringe benefits for *all* U.S. employees including those who do not receive the benefit (α), in an annual nationwide survey, *The Employer Costs for Employee Compensation* (ECEC). The first column of Table D.1 presents estimates, taken from the March 1997 and 1999 ECEC,[1] of the cost of health insurance, retirement and savings benefits, legally required benefits, and other benefits as a percentage of average earnings for all employees. Legally required benefits are the most expensive, costing about 10 percent of earnings. Health insurance costs about 7 percent of earnings, and retirement and savings benefits cost about 5 percent of earnings.

The percentages of all employees offered each type of fringe benefit (λ) are presented in the second column of Table D.1.[2] These data are obtained from *The Employee Benefits Survey* (EBS), which contains data on the availability of benefits to employees collected by the Bureau of Labor Statistics. In even-numbered reference years, EBS data are collected from small private establishments and state and local governments; in odd-numbered reference years, data are collected from medium and large private establishments. The BLS estimated the availability of benefits for all employees by combining EBS data from 1994 to 1997 (Bureau of Labor Statistics 1999).

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[1] We used data from the 1997 and 1999 ECEC because these surveys most closely coincide with the timing of the data on the availability of benefits of the Job Corps research sample for the most recent job in quarters 10 and 16 of the observation period.

[2] Both BLS and our survey data on the incidence of fringe benefits refer to the availability of fringe benefits. Some employees may choose not to use some benefits, such as health insurance.

TABLE D.1

ESTIMATES OF THE COST OF FRINGE BENEFITS AS A PERCENTAGE OF EARNINGS, ALL CIVILIAN EMPLOYEES FOR WHOM BENEFIT IS AVAILABLE

Fringe Benefit	Cost of Fringe Benefit as Percentage of Earnings, All Employees (α)	Percentage of Employees Offered the Fringe Benefit (λ)	Cost of Fringe Benefit as Percentage of Earnings, All Employees for Whom Benefit Is Available (β)[a]
		1997	
Health Insurance	7.2%	60%	12.0%
Retirement and Savings Benefits	4.8	58	8.3
Legally Required Benefits	10.4	100	10.4
Other Benefits	0.8	-	-
TOTAL	**23.2**	-	-
		1999	
Health Insurance	7.1%	60%	11.8%
Retirement and Savings Benefits	4.6	58	7.9
Legally Required Benefits	10.0	100	10.0
Other Benefits	0.8	-	-
TOTAL	**22.5**	-	-

SOURCE: Estimates of the cost of benefits as a percentage of earnings for all employees, including employees not offered the benefits, α are from the *Employer Costs for Employee Compensation*, March 1997 and March 1999. Estimates of the percentage of employees for whom the benefit is available (λ) are from the 1994 to 1997 *Employee Benefits Survey*, reported in U.S. Bureau of Labor Statistics (1999).

[a] $\beta = \alpha/\lambda$

To estimate the cost of a fringe benefit for all U.S. employees *who are offered the be*nefit (β), we divided the estimate of the cost of the fringe benefit for all U.S. employees by the proportion of employees who are offered it:

$$\beta = \alpha / \lambda^{3}$$

The third column of Table D.1 presents the estimates of the cost of fringe benefits for all employees for whom the benefit is available as a percentage of average earnings for all employees.[4] Health insurance and retirement and savings benefits are available for only about 60 percent of employees. Hence, while for all employees the cost of health insurance is about 7 percent of earnings, for all employees *offered health insurance* the cost is about 12 percent of earnings. The cost of retirement and savings benefits for all employees eligible for retirement and savings benefits is about 8 percent. The cost of fringe benefits fell slightly as a percentage of earnings between 1997 and 1999.

B. ESTIMATES OF THE COST OF FRINGE BENEFITS FOR MEMBERS OF THE RESEARCH SAMPLE

Members of the program group were more likely to be offered health insurance and retirement savings. Table D.2 presents the proportion of workers in the program and control group, who were offered health insurance and retirement and savings benefits on the most recent job held in quarters 10 and 16. A comparison of the fringe benefits offered to members of the program and control groups suggests that participation in Job Corps increased the percentage of research sample employees who were offered health insurance by about 2 percentage points and the percentage who were offered retirement and savings benefits by 3 to 4 percentage points.

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[3] As $\alpha = \lambda\beta + (1-\lambda) \times 0$.

[4] This can be interpreted as the cost as a percentage of the earnings of those offered the benefits if the average earnings of those who are offered the benefits and those who are not offered them is the same.

TABLE D.2

ESTIMATES OF THE COST OF FRINGE BENEFITS AS A PERCENTAGE OF EARNINGS FOR MEMBERS OF OUR RESEARCH SAMPLE

	Cost of Fringe Benefit as a Percentage of Earnings, All Employees for Whom Benefit is Available	Percentage Offered Fringe Benefit		Estimated Cost of Fringe Benefits as a Percentage of Earnings for All Employees	
Fringe Benefit	(β)	Program Group (λ_p)	Control Group (λ_c)	Program Group (α_p)	Control Group (α_c)
			1997/Most Recent Job Held in Quarter 10		
Health Insurance	12.0	49.9	48.3	6.0	5.8
Retirement and Savings Benefits	8.3	41.0	38.1	3.4	3.2
Legally Required Benefits	10.4	100.0	100.0	10.4	10.4
Other	-	N.A.	N.A.	0.8[a]	0.8[a]
Total	-	-	-	**20.6**	**20.1**
			1999/Most Recent Job Held in Quarter 16		
Health Insurance	11.8	50.5	48.3	6.0	5.7
Retirement and Savings Benefits	7.9	41.6	38.0	3.3	3.0
Legally Required Benefits	10.0	100.0	100.0	10.0	10.0
Other	-	N.A.	N.A.	0.8[a]	0.8[a]
Total	-	-	-	**20.1**	**19.5**

SOURCE: Table B.1, Schochet et al. (2000) Table VI.8, and Schochet et al. (2001) Table VI.8.

[a] The estimated cost of "other" fringe benefits is assumed to be the same as for all employees (see Table D.1).

NA = not available.

Compared to the average employee (Table D.1), control group members were about 12 percentage points less likely to be offered health insurance and 20 percentage points less likely to be offered retirement and savings benefits. This is not surprising, since the research sample members are just beginning their working career and typically have low-wage jobs.

Our estimates of the cost of fringe benefits for members of our research sample (α_p and α_c) are presented in the last two columns of Table D.2. We assumed that the cost as a percentage of average earnings of offering a fringe benefit to members of our research sample is the same as the cost as a percentage of average earnings of offering the benefit to an average U.S. employee (β). We estimated the cost of each benefit as a percentage of earnings for all employees in the program and control group by multiplying (1) the national average cost of the benefit for all employees for whom the benefit was available (β), by (2) the proportion of the program and control group members who were offered the benefit (λ_p and λ_c).

As program group members are more likely to be offered benefits, the cost of fringe benefits as a percentage of earnings is slightly higher for the program group members than for control group members. For the most recent job held in quarter 10, health insurance benefits cost an average of 6.0 percent of earnings for employees in the program group and 5.8 percent for employees in the control group. For the same job, retirement and savings benefits cost 3.4 percent of earnings in the program group and 3.2 percent of earnings in the control group. As all employees receive legally required benefits, the cost of such benefits is the same for members of both the program and the control group. As we do not have estimates of the proportion of employees who receive "other benefits," we assume that the cost of these benefits as a percentage of earnings for all members of the Job Corps research sample is 0.8 percent of earnings, the average cost for all employees.

We estimated that the total fringe benefit package offered at the most recent job held in quarter 10 cost an average of 20.1 percent of earnings for members of the control group and 0.5 percentage points more for members of the program group. Costs of fringe benefits for the most recent job held in quarter 16 are slightly lower as a percentage of earnings. The total fringe benefit package offered at the most recent job held in quarter 16 cost on average 19.5 percent of earnings for control group members and 0.6 percentage points more for members of the program group.

APPENDIX E

LIFETIME CHANGES IN THE RETURNS TO SCHOOLING: EVIDENCE FROM THE NATIONAL LONGITUDINAL SURVEY OF YOUTH

It is widely observed that additional schooling raises lifetime earnings (Card 1999). What has not been well documented is *timing* of when these gains are realized, particularly for disadvantaged youth. How does the advantage of an extra year of school affect earnings in any given year of a worker's career? Does the yearly earnings advantage of an extra year of school increase as the worker gets older? Does it decline, so that eventually the worker's level of schooling does not affect income? This appendix describes how we used national longitudinal data on schooling and earnings to address these questions for a sample of disadvantaged workers.

The findings are useful for the benefit-cost analysis of Job Corps, because they provide guidance for predicting the time path of Job Corps' impacts on earnings over participants' lifetimes beyond the observation period of the study. We have shown (Chapter III and Schochet et al. 2001) that Job Corps, like high school, provides intensive general education and training and imparts educational credentials to youth. Therefore, evidence on how the impact of a year of school on earnings changes over a student's lifetime can be used to infer how the impact of Job Corps on earnings might change over a participant's lifetime. As we will show, the evidence suggests that the earnings gains from a year of school rise slightly for males and fall slowly for females and remain roughly constant over the average worker's lifetime as a percentage of earnings. As the level of earnings grows, this constant percentage advantage grows in dollar terms.

A. APPROACH

1. Model

To estimate the time path of the returns to schooling, we examine a model of earnings determination similar to those proposed by Mincer (1974) and others:

$$(1)\quad \ln(EARN) = a + b(EDUC) + c(AGE) + d(AGE^2) + e(AGE * EDUC) + u$$

where *EARN* is annual earnings, *EDUC* is the worker's years of schooling, *AGE* is the worker's age, and *u* includes all additional determinants of earnings, such as school quality, ability, and other personal characteristics. We include age as a proxy for experience and allow earnings to increase quadratically with experience by including age-squared as an explanatory variable. We depart from the traditional model by including an interaction between age and education. This allows us to identify the time path of the return to schooling. Thus the goal of the analysis is to estimate *e*, the coefficient on this age-education interaction. This coefficient represents the annual change over a worker's lifetime in the percentage gain from an additional year of schooling. A value of *e* close to zero implies that the return to schooling stays constant over the worker's lifetime. A positive value of *e* implies that the returns to schooling increase with age. When negative, this coefficient is sometimes referred to as the "human capital depreciation rate" or the "decay rate," and it implies that the returns to schooling decrease with age.

2. Econometric Issues

Two econometric issues must be addressed if valid inferences are to be drawn about the time path of the returns to schooling. The first is identification of time effects. The returns to schooling can vary over time for two reasons: the aging of the worker and changes in the economy. The former is an "age effect" or "experience effect" and can vary among individuals within a cohort.[1] The latter is a "cohort effect" and is the same for all members of a given cohort. The question we seek to address is, What is the age effect, holding constant the cohort effect at some level that would be similar to the conditions faced by Job Corps participants in the future?

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[1] There is a distinction between an age effect and an experience effect, since workers of the same age may have spent different amounts of time in the labor force. Age is often used, however, as a proxy for experience, or "potential experience," since actual experience is endogenous and its independent effects are difficult to identify. We follow that convention here.

Estimates from cross-sectional data would confound the two effects. Estimates from longitudinal data with a single cohort would identify the age effect for one particular time profile of changes in the economy over the lifetime of the cohort. Here we used longitudinal data for multiple cohorts that were as close to the age of the Job Corps participants as possible, while still providing an earnings history long enough to allow us to identify the time path of the returns to schooling. By interacting model parameters with cohort indicators, we estimated the time path of returns to schooling for each cohort to see whether it would be reasonable to generalize to later cohorts.

The second issue is selection bias. That is, observed differences in earnings between people with different education levels reflect not only the true (causal) return to schooling, but other factors, such as motivation and ability, that also determine schooling level but are not directly observed. Unless we control in equation (1) for the effects of unobserved determinants of both educational attainment and earnings, like motivation and ability, estimates of the return to schooling will be biased. Coefficient estimates on any other included variables in equation (1) that were correlated with schooling, particularly the age-schooling interaction, could also be contaminated by selection bias. Economists have noted that other sources of bias besides self-selection, such as measurement error, could also affect the estimated relationship between schooling and earnings (see citations in Card 1999). In terms of the model, these problems can be described generally as a correlation between *EDUC* and the error term, *u*, or the "endogeneity" of schooling.

Our approach for dealing with these sources of endogeneity assumes that unobserved characteristics that affect both schooling and earnings do not vary over time but are fixed for individuals. Under this assumption, an individual fixed-effects (FE) model will identify an unbiased estimate of the interaction between age and education. The following version of the model is a fixed-effects specification, with subscripts for person (i) and time period (t) added for emphasis.

$$\text{(2)}\quad \ln(EARN_{it}) = a_i + c(AGE_{it}) + d(AGE_{it}^2) + e(AGE_{it} * EDUC_i) + u_{it}$$

Here the individual effect a_i captures all the time-invariant person-specific characteristics, so that only time-varying factors are left in the error term. The effect of any time-invariant characteristic on earnings cannot be identified by this model but is instead absorbed by the fixed effect, which summarizes all these influences. Consequently, we cannot estimate the size of the return to a year of schooling, because the parameter b is not estimated. However, under the assumption that the omitted variables such as ability and motivation are fixed over time, the FE model will provide unbiased estimates of e, the *change* in the returns to school for each year the worker ages.

We also estimate a variant of this model called the random-effects (RE) model, which does not try to estimate a specific intercept term for each sample member but instead estimates just the variance of the intercepts over a population. The RE model takes advantage of the variation between individuals in addition to the variation over time for each individual and thus is more efficient. It also allows for estimation of individual-level parameters, such as the main effect of schooling, because they are used to explain between-person differences. The main effect of schooling, together with the estimate of e, can be used to compute the estimated return to schooling for a given age.

B. DATA

We used the National Longitudinal Study of Youth 1979 (NLSY). This sample of about 13,000 youths born between 1957 and 1964 was reinterviewed every year from 1979 to 1998, except for 1995 and 1997. Thus up to 20 years of labor market data are available for each sample member, including observations of earnings when the workers are between the ages of 14 and 40. We believe that the experiences of these cohorts provide the best available data to represent the likely future experiences of the Job Corps sample, most of whom were born between 1971 and 1979 and will begin reaching age 40 in 2011.

The NLSY data include detailed schooling and earnings histories. We use the annual earnings data, highest grade completed, and degrees and certificates earned. The data set also contains personal background characteristics and a measure of cognitive ability, based on the Armed Services Vocational Aptitude Battery (ASVAB). We rescaled the ASVAB raw scores to approximate a standardized score on the Armed Forces Qualifying Test (AFQT).

1. Key Measures

The outcome variable in the analysis below is the logarithm of annual earned income for the calendar year prior to the interview. All dollar figures are adjusted to 1995 constant dollars. Earned income includes before-tax salary, wages, tips, military pay, farm income, and other income from a business or self-employment. Those reporting zero income in any year were assumed to have missing data for that year only. About 8 percent of males and 22 percent of females in the NLSY reported zero annual income at age 22. Only the years with positive income contributed to the analysis. We examined the robustness of this assumption by estimating separate models for males and also by estimating a model for all sample members, including those with zero earnings, by redefining the outcome variable as level of earnings rather than the logarithm.

The key explanatory variable is "years of completed schooling." The NLSY questionnaire asks respondents the highest grade of regular school they have completed. This variable is updated every year and edited for consistency.

2. Sample Restrictions

We conducted the analysis using a subsample that was defined to be as similar as possible to the Job Corps-eligible population. The subsample is defined with the following criteria:

- ***Disadvantaged.*** Family was in poverty or receiving some form of welfare in 1978 or 1979.
- ***Grade Restriction.*** Highest grade completed was grade 8, 9, 10, 11, 12, or 13.
- ***Degree Restriction.*** Did not attain a bachelor's degree or a higher degree.

In addition, the analysis used earnings histories beginning at age 22, to correspond to the period when most sample members would have completed school and begun entering the labor force. To test the robustness of the results, we estimated the model parameters with these restrictions relaxed one at a time. Results are reported here with the first restriction relaxed, that is, separately for the disadvantaged sample and for the full sample. We also report results separately by gender.

C. FINDINGS

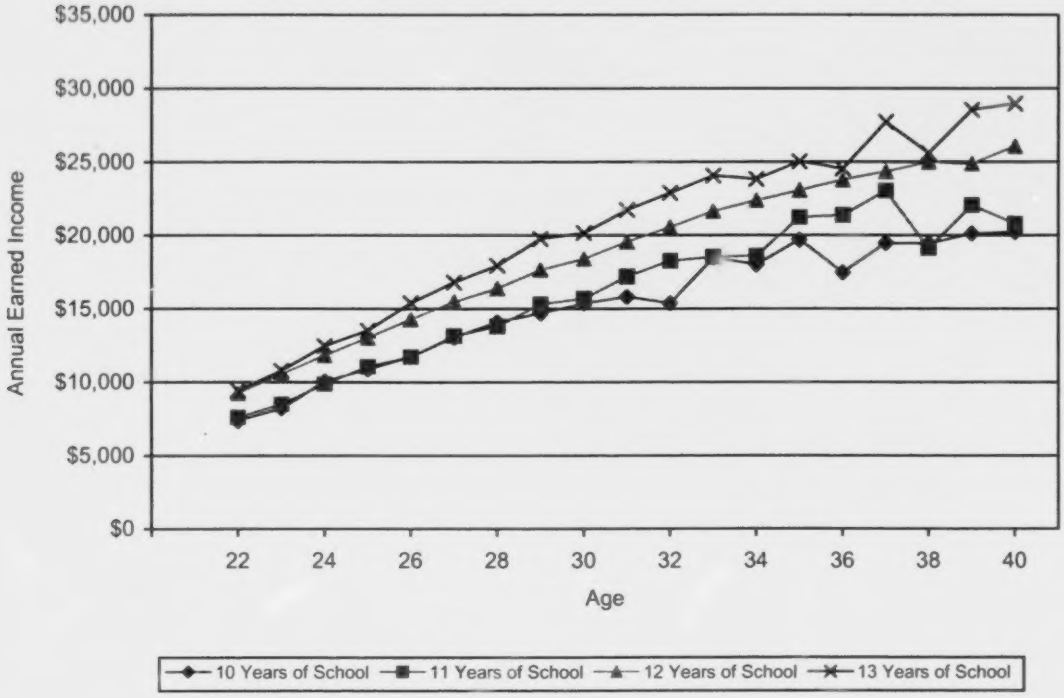
1. Descriptive Analysis

Figure E.1 shows the average annual earned income plotted by age for the disadvantaged subsample of the NLSY. Plots are shown for those with 10, 11, 12, and 13 years of schooling. The vertical gap between the average earnings of workers who differ by one year of completed schooling represents an unadjusted estimate of the annual return to schooling.

However, because of possible selection bias and other sources of endogeneity, the relationship in Figure E.1 should not necessarily be interpreted as causal. Nevertheless, the time pattern suggests that the return to schooling is positive and is not decreasing with age. The time pattern is less stable for the years after age 35, which are supported by smaller sample sizes and are hence subject to greater random error.

FIGURE E.1

AGE-EARNINGS PROFILE BY YEARS OF SCHOOLING
(1995 Dollars)



2. Econometric Analysis

Table E.1 presents parameter estimates from equation (2). Each coefficient represents the estimated age-education interaction effect (*e*) under an alternative set of assumptions for model specification and sample definition. The basic finding in Table E.1 is that under a range of assumptions, the impact of a year of school on annual earnings remains roughly constant as workers age, changing by less than 1 percentage point per year.

TABLE E.1

ESTIMATED COEFFICIENTS ON THE AGE-EDUCATION INTERACTION FROM LOG EARNINGS MODELS

(Coefficients × 100)

	Model Specification		
Sample Used	Fixed Effects	Random Effects	Sample Size
Males			
Disadvantaged	0.22*	0.23**	1,653
	(0.11)	(0.12)	
All	0.12*	0.06	3,582
	(0.07)	(0.07)	
Females			
Disadvantaged	-0.73***	-0.64***	1,699
	(0.17)	(0.16)	
All	-0.92***	-0.80***	3,339
	(0.11)	(0.11)	
Males and Females			
Disadvantaged	-0.07	-0.05	3,352
	(0.10)	(0.10)	
All	-0.24***	-0.24***	6,921
	(0.06)	(0.06)	

SOURCE: National Longitudinal Survey of Youth 1979.

NOTE: All regressions include age and age-squared as explanatory variables. Random-effects model also includes race, sex (for full sample estimates), cohort, high school credential status, and Armed Forces Qualifying Test (AFQT) score. Standard errors are in parentheses.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
*** Significantly different from zero at the .01 level, two-tailed test.

The change in the return to schooling as workers age is positive for males and negative for females, but it is small (less than 1 percent per year) for both groups. For disadvantaged males, a coefficient estimate of 0.0022 (based on a fixed effect model) means that the earnings advantage of a year of schooling for this group rises every year by 0.22 percentage points, or just over 4 percentage points in 20 years. For disadvantaged females, the comparable coefficient estimate is -0.0073, or a decline in 0.73 percentage points per year, or 15 percentage points in 20 years. Over long periods, even a slow decay rate will wipe out the gains from an additional year of school.

The basic finding that the estimated coefficient is small and positive for males and small and negative for females is robust to changes in the sample and econometric specification. It holds for both the disadvantaged sample and the larger sample of disadvantaged and nondisadvantaged workers using both the fixed-effects and the random-effects specifications. When males and females are pooled, the estimated coefficient on the schooling-age interaction is statistically insignificant.

Using the random-effects specification, we can predict the returns to a year of school, which depend on the worker's age. At age 30 for disadvantaged males, an extra year of school translates into an estimated earnings advantage of about 2 percent. For disadvantaged females, it is about 4 percent. These estimated returns to a year of school appear low because they include variables for whether the worker has a high school diploma or GED certificate, thus controlling for credential effects. Alternative models that do not include these credential effects predicted higher gross returns to schooling, but did not appreciably affect the time trend of interest here. These estimates of the return to schooling are difficult to interpret, because, as mentioned, they may include bias from self-selection or measurement error. Rather, the focus of this appendix is how these returns to schooling change with a person's age.

The base model used to generate these estimates assumes that the time trend of the returns to schooling is linear. That is, the change over a worker's lifetime in the advantage of a year of school is the same for workers when they are young as when they are older. To relax this restriction somewhat, we included a variable measuring the interaction of years of schooling with age squared. If the annual returns to schooling were changing at a rate that was not constant, the coefficient on schooling-age-squared interaction would be different from zero, but we found no evidence in the data to support that hypothesis. The coefficient estimate for the age-squared interaction is very nearly zero (Table E.2, column 2).

Another restriction imposed by the base model is that the parameter of interest (*e*) is the same for each cohort in the NLSY sample. To test this restriction, column 3 shows separate estimates by birth cohort, with cohort 1 defined as those born in 1957 and cohort 8 defined as those born in 1964. The statistical test for overall equality of the parameters was rejected, meaning the differences are statistically significant. The absolute size of the differences among them, however, is small. The youngest cohort (cohort 8) has the largest negative change in the returns to schooling, -0.0023, an annual decline of 0.23 percentage points, compared with a decline of 0.01 percentage points for the second-oldest cohort. We also estimated separate regressions for each cohort and found similar results.

Finally, we estimated a model that used the absolute level of earnings, rather than the logarithm (column 4). This specification included all years in which the worker reported zero earned income in the previous calendar year. Despite the trend in the full disadvantaged sample of a negative percentage growth in earnings impacts, the linear specification shows a positive growth in the absolute earnings advantage of a year of school. The effect is small, approximately $70 per year on average, with an approximate 95 percent confidence interval of plus or minus $14. The comparable figure for disadvantaged males (not shown) is larger, about

TABLE E.2

ESTIMATED COEFFICIENTS ON AGE-EDUCATION INTERACTION TERMS FROM ALTERNATIVE MODELS

(Coefficients × 100)

	Model			
Variable[a]	(1) Base Model	(2) Nonlinear Decay	(3) Cohort Differences	(4) Earnings Levels[b]
AGE*EDUC	-0.07 (0.10)	-0.32 (0.00)	—	70.1*** (6.9)
AGE*EDUC*COHORT 1	—	—	-0.07 (0.10)	—
AGE*EDUC*COHORT 2	—	—	-0.01 (0.10)	—
AGE*EDUC*COHORT 3	—	—	-0.09 (0.10)	—
AGE*EDUC*COHORT 4	—	—	-0.05 (0.10)	—
AGE*EDUC*COHORT 5	—	—	-0.06 (0.10)	—
AGE*EDUC*COHORT 6	—	—	-0.12 (0.10)	—
AGE*EDUC*COHORT 7	—	—	-0.14 (0.11)	—
AGE*EDUC*COHORT 8	—	—	-0.23** (0.11)	—
AGE-SQUARED*EDUC	—	0.00 (0.02)	—	—
Sample Size	3,352	3,352	3,352	3,512

SOURCE: National Longitudinal Survey of Youth 1979.

NOTES: Standard errors are in parentheses. Estimation sample includes disadvantaged males and females. All models include fixed effects, age, and age-squared terms. Dependent variable is log of annual earned income in models (1) through (3) and earned income in model (4).

[a] AGE is the age of the sample member and EDUC is their number of years of education. COHORT 1 through COHORT 8 refer to those born in 1957 through 1964, respectively.

[b] Dependent variable is annual earned income and coefficient estimate is not multiplied by 100.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

$109 per year, with a confidence interval of plus or minus $23. For disadvantaged females (also not shown) it is about $43 per year, plus or minus $15. Thus, even while the percentage gain in earnings from an additional year of schooling sometimes decreases over time, the absolute earnings gains are rising.

The main regression results can be best illustrated with an example. Figure E.2 presents hypothetical earnings profiles of a disadvantaged male sample member who completed the 11th grade and one who completed the 12th grade, with all their personal characteristics being otherwise equal. For illustration, we assume an initial annual earnings for the 11th-grade completer of $10,000 and an initial earnings for the 12th-grade completer of $11,200, so the initial earnings impact would be $1,200, or 12 percent.[2] Using these starting values, the profiles present the change in the impact over time predicted by our model. Here we use the estimated parameters for the effects of age, age squared, and the age-schooling interaction from the fixed-effects specification for disadvantaged males. By age 30, the difference in annual earnings is about $2,186, or 14.6 percent. By age 40, that difference is $2,686, or 17.0 percent.

D. CONCLUSION

The evidence clearly shows that the gains from schooling do not fade away rapidly but persist over most of the worker's lifetime. In percentage terms, this earnings advantage rises slightly over time for males and falls slightly for females. In absolute terms, the earnings advantage rises for all groups. Regardless of the sample used, the basic finding remains that the change over time in the returns to schooling is small, less than 1 or 2 percentage points per year. In sum, the effects of schooling are permanent.

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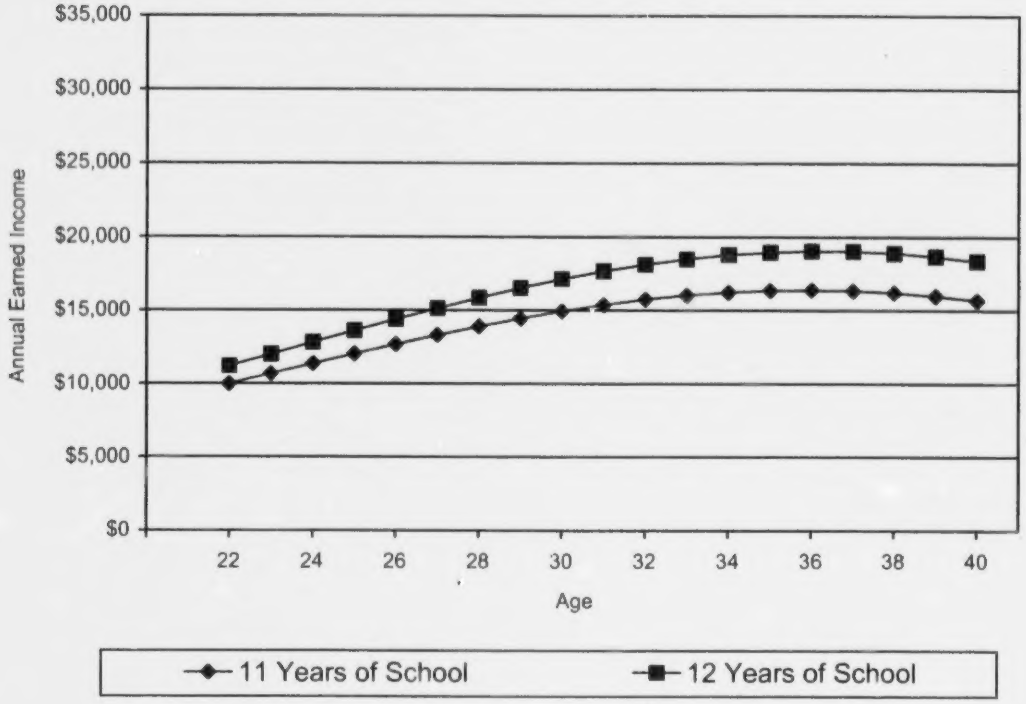
[2] The actual earnings levels vary considerably by grade level, gender, and sample definition. Estimates of the initial earnings impact of a year of school, which can be estimated from the random-effects model, vary considerably by sample and by model specification. The illustrative values chosen here are similar to those of Job Corps control group and program group members.

FIGURE E.2

PREDICTED AGE-EARNINGS PROFILE BY YEARS OF SCHOOLING
(1995 Dollars)



APPENDIX F

ESTIMATION OF THE BENEFITS OF REDUCED CRIME

The impact analysis (Schochet et al. 2001) showed that participation in Job Corps led to reductions in crime by participants and against participants. This appendix describes in detail how we estimated the value of the reduced crime. Section A of this appendix shows how we estimated the impacts of Job Corps on various types of criminal activity for the benefit-cost analysis. Section B describes how we placed dollar values on these impacts.

A. ESTIMATING IMPACTS ON CRIMINAL ACTIVITY

A key methodological decision was how to choose the units of analysis in which to estimate the benefits from reduced crime. To estimate the value of crime committed by participants, we relied primarily on self-reported arrest data. Reductions in crime yield two types of benefits, reductions in costs to the criminal justice system (CJS) and reductions in costs to victims. Correspondingly, we used two types of program impacts: (1) the impact on the number of arrests, categorized by the most serious charge filed; and (2) the impact on the number of distinct victimizations, categorized by the type of criminal act. Because it was infeasible to measure the impact on *victimizations* directly and accurately, we estimated the impact on victimizations indirectly, using the impact on *arrest charges* and accounting for the fact that not all victimizations result in arrest.

Arrests are the best units with which to measure crime committed by participants. To estimate the value of crime committed *against* participants, however, it was not possible to use arrests. Instead, we used self-reported data on the number of times each sample member was the victim of a given set of criminal acts. The rest of this section discusses the details of these approaches.

1. Impacts on Arrests for Crimes Committed by Participants

a. Most Serious Charge

Most CJS costs vary with the number of arrests. Therefore, to estimate the benefits from reduced CJS processing, we used the impacts of Job Corps on the number of arrests. To account for the different costs of processing different crimes, we categorized arrests by the type of offense. In cases where a person was arrested and charged with more than one offense, we considered only the cost of processing the most serious charge, and assumed the cost of processing the same offender with any additional charges was zero. For example, if a sample member was arrested and charged with robbery and vandalism, we assumed the cost of processing that offender to be the same as the cost of processing someone for robbery only. The "more serious" charge was defined as the one with the higher CJS processing costs. Less than 20 percent of all arrests had more than one charge. Of those, most included a drug, alcohol, or weapons violation.

b. Adjusting for Over- and Underreported Arrests

There is concern about respondents' overreporting or underreporting their involvement with the CJS.[1] If the number of over- or underreported arrests in our sample was the same in the program and control groups, then our estimates of the impacts of Job Corps would be unbiased. If, however, the *percentage* of over- or underreported arrests was the same in both groups, then the impact would be biased. In the past, some researchers have tried to adjust for underreporting by inflating the estimates of program impacts (Thornton et al. 1982). Later research has suggested that inaccurate reporting of criminal behavior could differ by the type of respondent or the type of crime and could result in overreporting as well as underreporting (Huizinga and Elliot 1986). These findings might suggest using different inflation factors or negative ones. Thus, over time, as the methods for conducting survey research have improved and the literature on reporting accuracy has grown, the appropriate remedy has become less clear.

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[1] Underreporting might occur, for example, if respondents fear giving socially undesirable responses. Overreporting might occur, for example, if a sample member was picked up by police but not charged with a crime, but the respondent believes he was charged. The Job Corps study measured all arrests, including those where no charge was filed. We found that Job Corps produced a small but statistically insignificant reduction in the number of arrests with no charge. These were not included in the benefit-cost analysis.

To address this concern, Needels and Burghardt (2000) conducted a separate study to validate the survey instrument used in the National Job Corps Study. Using administrative records on arrests of members of the research sample as a standard against which to compare self-reported arrests, we found the rates of overreporting and underreporting to be about equal (4 percent). While Needels and Burghardt caution against using administrative records on CJS involvement as a standard for accurate reporting, they did conclude that self-reported involvement with the CJS was not necessarily any less accurate than administrative records. They also found that self-reports and administrative data yielded similar conclusions about the impacts of Job Corps on crime. We believe these findings are sufficient to rule out systematic reporting bias. Our approach, therefore, was to estimate impacts based on self-reported arrests without making any adjustments.

2. Impacts on Victimization in Crimes Committed by Participants

The unit of analysis for appraising victim losses (both personal and property) is a *victimization*—an instance in which a person, household, or business is the victim of a specific crime. A loss would be incurred every time a person is victimized, whether or not an offender is arrested or charged. Also, a person can be the victim of more than one crime during any given incident, so each crime committed would be counted as a separate victimization.

To estimate the impacts of Job Corps on victimizations in crime committed by participants, we first estimated impacts on *arrests* per participant for each type of criminal offense. We then used national data and other secondary sources to estimate the number of victimizations of each type that occur per arrest. This allows us to convert arrests to victimizations. Multiplying the impacts on arrests per participant by the number of victimizations per arrest for each type of crime yields the estimated impact of Job Corps on victimizations per participant.[2] The conversion factor (victimizations per arrest) is the product of three component factors:

1. The number of reported criminal incidents as a fraction of the number of arrests (reciprocal of the arrest clearance rate)
2. The number of actual criminal incidents as a fraction of reported criminal incidents (reciprocal of the incident reporting rate)
3. The number of victimizations per actual criminal incident

The resulting conversion factor accounts for the fact that some incidents involve multiple victimizations or offenders, that not all incidents are reported, and that not all offenders are arrested. These three factors and their product are presented separately by offense in the first four columns of Table F.1. Data on each of these elements for each crime category were obtained from published sources as follows:

- ***Reported Incidents per Arrest.*** The first factor is the reciprocal of the arrest clearance rate, which the FBI publishes for all major crimes as part of its Uniform Crime Reporting (UCR) program. This rate is the fraction of offenses known to police that are "cleared" by arrest. (A clearance is made when at least one person is arrested for a given crime and turned over to the court for prosecution.) The FBI reports arrest clearance rates for eight separate offenses. For "other personal crimes" listed in Table F.1, we used the arrest clearance rate for all violent crimes. We also assumed that the arrest clearance rate for shoplifting, which was not one of the eight included crimes, was the same as the rate for larceny. For less serious offenses, such as vandalism, forgery, and liquor law violations, no other information was available, so we assumed that the arrest clearance rate was 1.0, the most cautious assumption possible.

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[2] Not all those arrested actually committed the crime with which they were charged. We assume that the number of innocent sample members arrested in the program and the control groups are equal.

TABLE F.1

VICTIMIZATIONS PER ARREST

	National Data				Job Corps Interview Data
Crime Category/Charge	Reported Incidents per Arrest	Actual Incidents per Reported Incident	Victimizations per Actual Incident	Victimizations per Arrest	Criminal Acts per Arrest
Murder and Non-negligent Manslaughter	1.46	1.05	0.88	1.35	n.a.
Aggravated Assault					
Forcible Rape	2.00	3.29	1.01	6.58	14.78
Aggravated Assault, Attempted Murder, or Kidnaping	1.94	1.71	1.00[a]	3.31	33.39[c]
Robbery	3.52	1.81	1.07	6.82	5.81
Burglary	7.35	.98	1.00[a]	14.55	4.30
Theft and Other Property Crimes					
Arson	6.13	1.00[a]	1.00	6.13	7.06
Motor Vehicle Theft	7.04	1.28	1.00[a]	9.01	13.94
Larceny	5.21	3.61	1.00[a]	18.81	8.78
Shoplifting	5.21[b]	3.61[b]	1.00[a]	18.81	8.78[b]
Vandalism, Forgery or Counterfeiting, Fraud, Writing Bad Checks, Embezzlement, and Blackmail or Extortion	1.00[a]	1.00[a]	1.00[a]	1.00	8.13
Other Personal Crimes					
Simple Assault or Fighting	2.04	2.40	1.10	5.39	33.39[c]
Sex Offenses Other Than Forcible Rape or Prostitution	2.04	2.40	1.00	4.90	n.a.
Family Offenses	2.04	2.79	1.10	6.26	n.a.
Miscellaneous Crimes					
Liquor Law Violations	1.00[a]	1.00[a]	1.00[a]	1.00	n.a.

SOURCES: U.S. Department of Justice 1999; Maguire and Pastore (1996); 12-month, 30-month, and 48-month followup interviews.

TABLE F.1 *(continued)*

NOTE: Drug law violations, buying or receiving stolen property, and miscellaneous crimes other than liquor law violations are assumed to have zero direct victim costs so they are not shown. Social costs of liquor law violations are already expressed as dollars per arrest, so we use a rate of 1.0 victimization per arrest.

[a] No information was available, assumed to be 1.0.

[b] No information was available for shoplifting, assumed to have the same rates per arrest as larceny.

[c] We were not able to distinguish between simple and aggravated assaults using interview data, so they were combined into a single category and assumed to have the same rate of criminal acts per arrest.

n.a. = not available

- ***Actual Incidents per Reported Incident.*** The second factor is the reciprocal of the incident reporting rate. Incident reporting rates can be measured by comparing official incident data from the FBI's annual UCR with official victimization statistics from the annual National Crime Victimization Survey (NCVS). This ratio is made up of the offenses known to police divided by the number of offenses reported by victims. Estimates were not available for those offenses committed against commercial establishments, such as arson, shoplifting, and vandalism. For burglaries and robberies, which can victimize both household and commercial establishments, we assumed that the incident reporting rates for households applied generally to crime against both households and businesses. For shoplifting, we assumed it was reported at the same rate as larceny. For arson, vandalism, and all other crimes where no data were available, we used a ratio of 1.0, assuming cautiously that every incident was reported.

- ***Victimizations per Actual Incident.*** For some crimes, victim surveys record the number of offenders involved in an incident and the number of separate victimizations that occur in any given incident (Maguire and Pastore 1997). For the category of murder and non-negligent manslaughter, official records are kept on the number of offenders and the number of victims. The ratio of these two suggests that, on average, more than one offender is involved in the murder of any one person. Thus, if a sample member is one of two people arrested for the murder of one victim, then that arrest should count for half of one murder in the benefit-cost calculation. This ratio makes the adjustment. For any crimes where such information was not available, we assumed the average ratio was 1.0.

The number of victimizations per arrest ranges from 1.35 for a crime such as murder, which is almost always reported and very often leads to arrest, to 18.81 for larcenies, of which about three-quarters go unreported (Maguire and Pastore 1998) and over 80 percent are never cleared by arrest (U.S. Department of Justice 1999). Several types of crime, notably drug law violations, possession of stolen goods, and weapons offenses, are not listed in Table F.1, because we assume there are no direct, measurable victim costs for these crimes.

As a check on the conversion factor, we also calculated the number of criminal acts per arrest, using the Job Corps interview data. As part of the National Job Corps Study interviews, we asked sample members to report on illegal activities that they engaged in. By matching these self-reported criminal activity data with self-reported arrest data, we constructed estimates of the number of criminal acts per arrest, which is similar to victimizations per arrest. The last column of Table F.1 shows these estimates. Sample members in our study reported committing more acts of rape, assault, and motor vehicle theft per arrest than we would have predicted based on national statistics, but fewer acts of robbery, burglary, arson, other theft, and fraud. Overall, using either set of conversion factors produced similar estimates of the benefits of Job Corps (Appendix B). We relied primarily on the national data, because some anomalous findings in the interview data raised doubts about whether respondents had understood the questions, which dealt with very sensitive issues.

3. Impacts on Victimizations in Crimes Against Participants

The methods for estimating the value of reduced crime against participants were similar to, but not the same as, those for estimating the value of reduced crime committed by participants. The primary difference was the type of data used to estimate the impacts. Because our sample members were the victims of these crimes, we asked them directly about the number of times they were victimized for each of a set of crimes (instead of asking the offenders about arrests, as we did for crimes committed by sample members). While there may be some questions about the reliability of asking offenders about their illegal activities, we believe that victims would be more forthright and accurate about reporting incidents. Still, we did not ask directly about rape and therefore did not estimate an impact on that outcome. For murder, we had to use other methods (described below) to estimate the impact of Job Corps on participants' probability of being murdered.

To estimate the value of the benefits to participants of reductions in crime against them, we multiplied the impacts by the victim costs of each crime. In order to conduct a sensitivity test of the assumption that the victims of such crimes are not replaced (Appendix B), we also estimated the CJS cost savings that would accompany reductions in crime against each participant. We did this by using the conversion rates listed in Table F.1 to calculate impacts on arrests and the estimates of the CJS costs per arrest for each crime discussed in Section B.

One other methodological difference is that the incident data were not linked to the date of random assignment. Self-reported victimization is measured only for the one-year period prior to each of the three follow-up interviews, so it was not possible to construct a continuous 48-month history of victimizations, as we did with arrests.[3] To produce impact estimates for each year of the observation period, we assumed that the impacts on victimizations reported for the year prior to the 12-month interview were representative of the impacts in the first year after random assignment (year 1), the impacts from the year prior to the 30-month interview were representative of year 2, the average of the 30-month and 48-month impacts was applicable to year 3, and the 48-month impacts were applicable to year 4.

A key offense that was missing from the analysis of crimes against participants was murder. To estimate the impacts of Job Corps on participants' probability of being murdered, we first estimated the impact of Job Corps on the probability of death during the observation period. While we confirmed the death of each sample member who died, we did not systematically collect data on the causes of death. However, anecdotal evidence from survey staff suggests that the causes were split roughly evenly among crime, health, and accidents.

The impact on deaths for all eligible applicants is simply the difference in the death rates of the program and control groups. In estimating the death rate, we did not use all those who completed a baseline interview, because for those sample members with whom we lost contact, it was not possible to determine whether a death occurred within the full 48-month observation period. Therefore we used the 48-month analysis sample only. For this analysis, we had to determine which of the deceased sample members would have completed a 48-month interview had they not died. To do this, we assumed that the probability of completing a 48-month interview was the same for those who died as for those who did not. We used the fraction of nondeceased sample members who completed a 48-month interview (and hence were in our analysis sample) to predict the probability of a deceased sample member completing the 48-month interview. We did this separately for individual subgroups defined by the pattern of completion for all interviews prior to the sample member's death. These patterns, their corresponding completion probabilities, and the resulting death rates for each research status group are presented in Table F.2. The death rate was 895 per 100,000 control group members and slightly lower for the program group, 843 per 100,000. This difference was not statistically significant. To estimate the impact per participant, we used the same methods that were used for all other impact estimates. We divided the impact on eligible applicants by the Job Corps enrollment rate net of crossovers. See Schochet (2001) for details.

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[3] Constructing a continuous timeline of victimization would have provided more comparable estimates, but it would have required respondents to recall events over long periods of time. This would be likely to introduce greater recall errors and other reporting errors.

We assume that one-third of the impact on *deaths* of Job Corps participants was an impact on *murders*. We show in the sensitivity analysis (Appendix B) that the value of the reduced probability of murder for participants is about $162 per participant.[4]

B. DOLLAR VALUE OF IMPACTS

Another key challenge in estimating the benefits to society from a reduction in crime is to place a dollar value on all the impacts on criminal activity described above. In this section we first discuss the components of CJS costs that should be included in the analysis, the data sources and methods used to estimate CJS costs, and the particular estimates we used for each type of criminal offense. We then do the same for victim costs.

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[4] For placing a value on the estimate of Job Corps's reduction in mortality as a whole, not distinguishing among causes of death, the total value would simply be three times this amount, or $486 per participant.

TABLE F.2

ESTIMATED RATES OF SAMPLE MEMBER DEATHS BY RESEARCH STATUS

Interview Completion Status of Deceased Sample Members					
12-Month Followup	30-Month Followup	Number of Deaths	Predicted Probability of Completing 48-Month Interview[a]	Estimated Deaths That Would be in 48-Month Sample	Proportional Death Rate in 48-Month Sample
		Control Group			
Did Not Reach	Did Not Reach	18	0.791	14.2	
Did Not Complete	Did Not Reach	5	0.408	2.0	
Completed	Did Not Reach	15	0.837	12.6	
Completed	Did Not Complete	7	0.516	3.6	
Completed	Completed	9	0.897	8.1	
Any	**Any**	**54**		**40.5**	**0.00895**[b]
		Program Group			
Did Not Reach	Did Not Reach	21	0.762	16.0	
Did Not Complete	Did Not Reach	2	0.497	1.0	
Completed	Did Not Reach	32	0.785	25.1	
Completed	Did Not Complete	5	0.523	2.6	
Completed	Completed	16	0.831	13.3	
Any	**Any**	**76**		**58.0**	**0.00843**[c]

SOURCE: Data from 12-month, 30-month, and 48-month followup interviews.

[a] The predicted probability of completing the 48-month interview is the proportion of sample members in each completion status category, excluding deceased sample members, who completed a 48-month interview.

[b] There were 4,525 control group members in the 48-month sample, including estimated number of deceased sample members.

[c] There were 6,886 program group members in the 48-month sample, including estimated number of deceased sample members.

1. CJS Costs: Dollars per Arrest

The costs to society of processing an arrest of each crime type are presented in Table F.3. The CJS cost estimates include the following four components:

1. ***Investigation.*** Where estimates of the costs of investigating each reported incident are available, we divided them by the number of arrests made for those incidents, producing an average investigation cost per arrest.
2. ***Booking and Arrest.*** Booking and arrest costs are incurred for every arrest made.
3. ***Prosecution and Trial.*** These costs include the value of time spent by lawyers, courtroom staff, jury members, and witnesses, plus the associated overhead and support costs used in prosecuting and defending a case. Also included in trial costs are the pre-trial detention (jail) costs usually borne by local governments. For those arrests where criminal charges were dropped before proceeding to this stage, the prosecution and trial costs would be zero. Thus the average prosecution and trial costs represent the cost of cases actually prosecuted times the probability of an arrest leading to prosecution.
4. ***Post-trial Costs.*** Post-trial costs include appeals but depend mostly on sanctions. The cost of sanctions includes the cost of probation, parole, and prison terms actually served. For arrests for murder, it also includes the cost of postconviction review and capital punishment, multiplied by the probability of an arrest's resulting in a death sentence. Those arrests that do not result in conviction would have zero post-trial costs. Those arrests that are plea-bargained to a lesser charge would typically have lower post-trial costs. Estimates are based on average sentences served by those arrested with the given charge.

These costs components can vary by the type of crime and whether the arrest is handled by the juvenile or adult justice system. We estimated the CJS costs for adults for each type of offense. We did not find evidence that a significant portion of the arrests our sample members reported were handled by juvenile justice system or that the costs of processing juvenile cases are appreciably different from costs in the adult system.

TABLE F.3

CRIMINAL JUSTICE SYSTEM PROCESSING COSTS BY CRIMINAL OFFENSE CHARGE

Crime Category/Charge	Social Cost Per Arrest[a] (1995 Dollars)	Principal Source
Murder and Non-Negligent Manslaughter	$122,400	Cohen et al. 1994
Aggravated Assault and Related Violent Crimes		
Aggravated Assault, Attempted Murder, Forcible Rape, Kidnaping	9,600	Jacoby et al. 1990
Robbery	19,300	Rajkumar and French 1997
Burglary	14,300	Rajkumar and French 1997
Theft and Other Property Crimes		
Arson, Motor Vehicle Theft	6,500	Rajkumar and French 1997
Larceny, Other Theft	5,100	Jacoby et al. 1990
Shoplifting, Buying, Receiving, or Possessing Stolen Property, Vandalism, Forgery or Counterfeiting, Fraud, Writing Bad Checks, Embezzlement, Extortion	1,200	Jacoby et al. 1990
Drug Law Violations		
Drug Manufacture, Sale, or Distribution	7,100	Jacoby et al. 1990
Drug Use or Possession	1,200	Jacoby et al. 1990
Other Personal Crimes		
Simple Assault or Fighting, Sex Offenses Other Than Forcible Rape and Prostitution, Family Offenses	1,200	Jacoby et al. 1990
Miscellaneous Crimes		
Liquor Law Violations, Disorderly Conduct, Loitering, Curfew Violations, Trespassing, Parole or Probation Violation, Prostitution, Weapons Offenses, Obstruction of Justice, Motor Vehicle Violations, Gambling, Smoking Cigarettes Under Age, Truancy, Minor Running Away	1,200	Jacoby et al. 1990

[a] All estimates were rounded to the nearest $100 in the calculations of net benefits to reflect our uncertainty about their true values.

a. CJS Cost of Murder and Non-negligent Manslaughter

Murder is the most costly crime. The components of the CJS cost of an arrest for murder are listed in Table F.4. The largest component is the cost of imprisonment, which averages about $86,000 per arrest. This is based on an average time actually served (among those who are convicted) of 9.6 years (Cohen et al. 1994) multiplied by a cost of prison of $46 per day[5] and a probability of 64 percent that an arrest for murder will lead to a murder conviction (Cohen et al. 1994; and U.S. Department of Justice 1999). This conviction rate excludes convictions that result in a death penalty, which are discussed below, and ignores the time spent in prison by those who are arrested for murder but actually convicted of lesser offenses.

Although it is rare, capital punishment should be included in the CJS cost of murder.[6] Of the arrests for murder that result in convictions, about 2 percent nationwide result in capital punishment.[7] The CJS costs rise considerably in these cases. The additional costs of convictions that lead to execution are due to the additional litigation, the extensive appellate and postconviction review, and the staff and materials needed to imprison and execute capital offenders. Several estimates of the cost of capital punishment are available, but none are definitive. We used an estimate of $1.8 million, based on data from New York state (Cohen et al. 1994). Other estimates range between $0.3 million in North Carolina (Cook and Slawson

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[5] Published estimates of prison costs vary considerably. State prison costs in Minnesota, according to the Minnesota House of Representatives House Research, were estimated to be $81 per day on average (Tilsen 1998). Cohen et al. (1994) cited sources estimating the cost of state and federal prisons between $32 and $52 per day and used $44 per day in their analysis. The four counties in Jacoby et al. (1990) reported unit costs of prison ranging between $37 and $82 per day (in 1995 dollars). Our analysis assumed that average prison costs were $46 per day, the estimate given by both Ventura County and Allegheny County in the Jacoby et al. study.

[6] One sample member in the Job Corps study was on death row.

[7] According to data from the U.S. Department of Justice, 75,990 people were arrested for murder or non-negligent manslaughter between 1995 and 1999 (U.S. Department of Justice 1996, 1977, 1978, 1999). During that same period, 1,198 people, or 1.6 percent, were sentenced to death (Snell 1999).

1993) and nearly $19 million in California (Cohen et al. 1994).[8] When multiplied by the probability of conviction and discounted for the fact that most of the costs of capital punishment are borne many years after the offense is committed, the cost per murder arrest for capital punishment is about $22,600. As shown in Table F.4, the average total cost of processing a murder arrest (including costs of capital crimes) is thus estimated to be about $122,400.

TABLE F.4

COMPONENTS OF THE CJS COST OF MURDER
(1995 Dollars)

Component	Cost per Arrest
Investigation	$1,444
Prosecution and Defense	11,990
Probation	658
Prison	85,661
Capital Punishment	22,646
Total	**$122,400**

SOURCE: Cohen et al. (1994), U.S. Department of Justice (1998), and Jacoby et al. (1990).

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[8] These estimates vary not only because of the legal systems in the different states, but because of the methods and assumptions used by each study.

b. CJS Cost of Other Crimes

The CJS costs of robbery, burglary, and motor vehicle theft were based on estimates published by Rajkumar and French (1997).[9] The original estimates were reported as costs per offense, regardless of whether the offense resulted in an arrest.[10] Therefore, we adjusted the estimates by multiplying them by the corresponding conversion factors listed in Table F.1. We assumed the CJS cost of arson, for which no explicit estimates were available, was the same as that of motor vehicle theft, because the average prison sentence served, a major cost component, was the same for the two crimes (Maguire and Pastore 1997).

The CJS cost estimates for all other crimes were based on data found in Jacoby et al. (1990), a detailed set of raw data on CJS processing in four counties across the United States (Mecklenburg [NC], Ventura [CA], Allegheny [PA], and Alexandria [VA]). For aggravated assault, attempted murder, forcible rape, and kidnapping, we used the average cost of all violent felonies, $9,600 per arrest.

For larceny and other theft, there was no single plausible estimate available. The average cost of all property felonies was $4,400 per arrest, but other estimates place the cost of an arrest for larceny at a much higher level, over $11,000 (Rajkumar and French 1997). That estimate, however, was very sensitive to the estimate of victimizations per arrest, which itself is uncertain. Therefore, we used a CJS cost of $5,100 per arrest based on the key ingredient of such costs, prison sentence length. Because the average prison sentence served for general theft was about 22 percent shorter than for motor vehicle theft (U.S. Department of Justice 1999), we assumed the cost of processing an arrest for general theft to be $5,100, or 22 percent less than the CJS cost of an arrest for motor vehicle theft.

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[9] All cost estimates are approximate and are therefore rounded to the nearest $100.
[10] Personal communication with French (2000).

For all personal crimes (such as simple assault and family offenses), all simple property crimes (such as vandalism and fraud), and all miscellaneous crimes (such as disorderly conduct), we assumed the CJS cost to be equal to the average for all misdemeanors, $1,200 per arrest (Jacoby et al. 1990).

The cost of processing someone arrested for a drug law violation is difficult to estimate, because the seriousness of such a crime varies so greatly and depends on so many factors, including the nature of the offense (possession versus use or intent to distribute), the type of drug involved (marijuana versus heroin or cocaine), the quantity of drugs involved, and whether it is a repeat offense. Published cost estimates distinguish only between felonies and misdemeanors. The Job Corps study, however, distinguishes only between drug law violations involving trafficking (sale or manufacture) and possession (or use), regardless of jurisdiction, severity, or other mitigating factors that might determine whether the arrest is prosecuted as a felony. We assumed that all arrests for drug trafficking were felonies and all arrests for drug possession were misdemeanors. The estimated cost of processing a felony drug offense is $7,100 (Jacoby et al. 1990). For drug misdemeanors, we used the average cost for processing any misdemeanor, which we estimate to be $1,200 (Jacoby et al. 1990).

2. Victim Costs: Dollars per Victimization

We considered the following four components in the measured cost of crime to victims:

1. ***Personal Injury.*** Medical treatment and mental health treatment made necessary by personal injuries are all included, whether or not the treatment is sought. Cohen et al. (1994) argue that victims who do not seek needed treatment still bear the pain and suffering.
2. ***Lost Productivity.*** Lost wages and the equivalent value of lost time for housework, child care, and other uses of time are a cost of injuries sustained by crime victims. This includes time spent recovering from injuries and dealing with the police and the legal system. These are included in the cost estimates to the extent possible.
3. ***Property Loss.*** Victims' property may be damaged, destroyed, or stolen. In the past, some benefit-cost analyses have treated the value of stolen property as a transfer from

victims to criminals and hence not a net loss to society (Thornton et al. 1982). Here, however, we follow Trumbull (1990) and assume that benefit-cost analyses should not place a social value on illegitimate gains.

4. ***Insurance Processing.*** We include in the costs of victimization the administrative cost of life, health, and property insurance. The premiums and paid losses from insurance are assumed to average out to zero and represent transfers among people in a risk pool. The administrative costs associated with processing claims to compensate crime victims' losses, however, are considered here to be a cost to society.

The estimates presented here do not include the cost of victim services, family support, trauma to witnesses of crime, increased fear of crime among all potential victims, and protective measures taken by potential victims to avoid or protect against future crime. These components, for which there are no reliable quantitative estimates, remain unmeasured. Therefore, our estimates of victimization costs should be interpreted as cautiously erring on the side of understating the potential benefits of the reduction in crime. Researchers who have tried to value the intangible costs of violent crime (Cohen et al 1994; Miller et al 1996; and U.S. Department of Justice 1996) have reported estimates that are often 10 to 20 times the size of the tangible costs that we included here.

The costs to victims for each crime type, shown in Table F.5 and discussed below, were estimated based on a variety of published sources. Most of these sources draw on the annually administered National Crime and Victimization Survey (NCVS), which asks a nationally representative sample about their experiences as victims of each type of crime and about personal injury, lost days of work, and property loss. The NCVS has certain limitations. It captures only short-term costs to victims, it only surveys victims over age 12, and it includes only victims of household crimes. Therefore we used alternative sources to place a dollar

TABLE F.5

COSTS PER VICTIMIZATION BY CRIME TYPE

Crime Category/Charge	Social Cost Per Victimization[a] (1995 Dollars)	Principal Source
Murder and Non-Negligent Manslaughter	$553,900	Current Population Survey
Aggravated Assault and Related Violent Crimes		
Forcible Rape	7,500	Cohen et al. 1994
Aggravated Assault, Attempted Murder, or Kidnaping	1,000	Cohen et al. 1994
Robbery	2,300	Cohen et al. 1994
Burglary	2,800	Hakim and Shachmurove 1996
Theft and Other Property Crimes		
Arson	17,400	Karter 1999
Motor Vehicle Theft	4,300	U.S. Department of Justice 1998
Larceny	650	U.S. Department of Justice 1998
Shoplifting, Vandalism, Forgery or Counterfeiting, Fraud, Writing Bad Checks, Embezzlement, Blackmail or Extortion, and Bribery	150	U.S. Department of Justice 1998
Other Personal Crimes		
Simple Assault or Fighting, Sex Offenses Other Than Forcible Rape or Prostitution, Family Offenses	600	Miller et al. 1996
Miscellaneous Crimes		
Liquor Law Violations	700	Miller et al. 1996

[a] All estimates were rounded to the nearest $100 in the calculations of net benefits to reflect our uncertainty about their true values.

value on the victim costs of murder and other violent crimes, whose costs extend beyond the short term, and on arson and burglary, which can be committed against businesses.

a. Victim Costs of Murder

The cost to victims of murder is of course impossible to quantify. Nevertheless, it is important that the benefit-cost analysis at least recognize the possibility that Job Corps can have an impact on violent crime and actually save lives. Rather than place a dollar value on a human life, we estimated the lost productivity of a typical murder victim. This approach is similar to using the amount that would be paid to a victim's family from a life insurance claim as compensation for lost earnings. We also include the administrative costs of processing a life insurance claim.

Using data from the Bureau of Labor Statistics' Current Population Survey, we estimated the average discounted value of remaining lifetime earnings for a full-time worker with the characteristics of typical murder victims. Characteristics of the murder victims, including age, sex, and race were based on FBI statistics (U.S. Department of Justice 1999). The average victim was 32 years old and was assumed to retire at age 62. The proportions of victims in each race and sex category were used to weight the data: 35 percent of victims were white males, 38 percent were black males, 14 percent were white females, and 9 percent were black females. The remaining 4 percent, those of other race/ethnic categories, were assumed to have earnings profiles similar to the weighted average of whites and African Americans. We used the average earnings of full-time workers to place a positive value on the time of those who are not in the workforce. We used data from the U.S. National Center for Health Statistics (cited in U.S. Bureau of the Census 1998, Table 130) to adjust the results for the probability of dying of other causes. The value of lost output of a typical murder victim is thus estimated to be $549,203.

We included another $4,651, which is the cost of processing life insurance claims. This estimate is based on the average life insurance coverage per household from the 1990 census ($60,100 when adjusted for inflation) times the probability of carrying life insurance (86 percent) times the cost of processing a life insurance claim (9 percent).[11]

The total estimated cost per murder victim is thus $553,900. This figure does not include the costs of funeral or emergency medical services, nor does it place a value on lost companionship or any of the other unmeasured elements discussed in the benefit-cost analysis (Chapter V).

b. Victim Costs of Other Crimes

Estimates of the costs to victims of violent crimes—rape, robbery, and aggravated assault—were based on data published by Cohen et al. (1994). The estimates of the components of the cost per victimization are presented in Table F.6. (We consider kidnapping and attempted murder forms of aggravated assault for the purposes of victim cost estimation.) The most important components are the costs of mental health treatment and lost productivity.

For other personal crimes, such as simple assault and family offenses, no direct estimate of victim costs was available. To approximate, we divided the total medical costs of assaults (including attempts) in the NCVS due to adult domestic violence by the number of victimizations, both reported in Miller et al. (1996). We added 5.6 percent to account for the administrative costs of processing insurance claims, assuming that 67.3 percent of injuries would be covered by public or private health insurance and that the processing costs were 8.4 percent of the value of claims paid (Cohen et al. 1994). This results in an estimate of about $600 per victimization, which we applied to all personal crimes.

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[11] These estimates are derived from Cohen et al. (1994).

TABLE F.6

COMPONENTS OF VICTIM COSTS OF VIOLENT CRIME
(1995 Dollars per Victimization)

	Crime Category		
Type of Cost	Forcible Rape	Aggravated Assault	Robbery
Medical Treatment for Physical Injuries	$475	$193	$157
Mental Health Costs	4,914	456	1,122
Lost Productivity	2,105	362	592
Lost or Stolen Property	0[a]	0[a]	424
Administrative Costs of Health and Property Insurance	28	12	35
Total[b]	$7,523	$1,024	$2,330

SOURCE: Cohen, Miller, and Rossman, 1994.

[a] Property costs assumed to be zero for rape and assault because such losses would be counted separately as theft or robbery.

[b] The total may not equal the sum of the rows because of rounding.

The costs of property crimes can also be quite high, although the costs come from property loss rather than personal injury. The most serious of these crimes are arson and burglary. The average cost of arson, $17,400, comes mainly from the National Fire Protection Association (Karter 1999). It includes almost $2,000 that we added to their estimate to account for the cost of processing fire insurance claims with a 70 percent insurance coverage rate and 16 percent cost of claims processing. We used these same assumptions for property insurance processing costs and coverage rates for all property crimes. Our estimates of the victim costs of arson include property damage and insurance only. To avoid double-counting, we did not include the cost of injuries from arson, estimated by Miller et al. (1996) to be about $3,000, since our estimate of the impacts on charges for aggravated assault and attempted murder would already include arson-related personal injuries.

The cost of burglary is based on a study by Hakim and Shachmurove (1996) on residential and commercial burglaries in a large suburban Pennsylvania community. While the data are not nationally representative, they are comprehensive, breaking down the cost components in ways that enabled us to select them to match the definitions used in this study. We used FBI data (U.S. Department of Justice 1999) to weight the relative costs of residential and commercial burglary to reflect their proportions nationally. We also added the costs of processing property insurance claims and used the national statistics to adjust the figures to account for attempted burglaries that did not result in any loss.[12]

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[12] Any unlawful entry of a structure to commit felony or theft is a burglary. Attempted forcible entry is included.

The average victim cost of a shoplifting incident is $150, based on data from national statistics (U.S. Department of Justice 1999). This includes insurance costs borne by shop owners (costs assumed to be the same as those borne by households). No published data were available on the average cost to victims of vandalism or crimes of fraud, such as forgery and passing bad checks. Therefore we used the same estimate as that used for shoplifting, $150, for these offenses. Even if we used a substantially higher estimate, the effect on the overall conclusions of the benefit-cost analysis would be very small. The benefits of reduced victim costs for these crimes combined is less than $5 per participant.

In benefit-cost analysis there is some debate over whether to treat the value of stolen property as a loss to society or as a transfer from victims to criminals (Trumbull 1990). Some portion of the value of stolen property is sometimes considered a transfer, because one might argue that the value that is consumed by criminal offenders is a benefit that offsets part of the victim's loss. The value of the stolen property to the criminal, often captured by its sale price on the black market as a percentage of the value of the property to its original owner, is sometimes called the "fence rate." Cash, for example, would have a fence rate of 100. Stolen clothes, on the other hand, might have a fence rate of 25, reflecting the fact that the thief might be able to sell the clothes for only 25 percent of their original value. The remaining 75 percent of the value is lost to society in the transaction of the crime.

Participation in Job Corps would therefore result in a loss to participants of the value of this property they would have stolen in the absence of the program. In our analysis, however, we do not treat stolen property as a transfer, because the goods are illegitimate and the criminals, as consumers of ill-gotten gains, do not have "standing" in the benefit-cost analysis. Therefore, their gain should not be considered a benefit to society that is produced (or prevented) by Job Corps. If we did include the reduction of stolen property as a *cost* of Job Corps to participants, it would be accounted for mostly by the impacts on burglary, robbery, larceny, and motor vehicle theft. These estimates, presented in Table F.7, show that the estimated value of stolen property to criminals would be less than $50 per participant.

There are several offenses for which we assumed there were no direct costs to victims. These are primarily drug law violations, possession of stolen property, weapons possession, loitering, disorderly conduct, prostitution, and obstruction of justice. Often arrests where these charges were brought also included other, more serious charges, which did incur a victim cost.

The exception to the rule of not counting the victim costs of crimes in the miscellaneous category was liquor law violations, since these can involve potentially large losses. About half of all liquor law violations in the United States are accounted for by crimes other than drunk driving, such as public intoxication and selling alcohol to minors (Maguire and Pastore 1997). Not all drunk driving violations stem from an accident, and not all accident-related arrests involve property damage or injury where alcohol was the main cause. Nevertheless, the high costs of injury and property damage from driving while intoxicated should at least be accounted for. Miller et al. (1996) estimate the average cost of an accident caused by drunk driving, whether with or without injury, to be about $6,500. We assume that 20 percent of arrests for drunk driving involved an accident. Therefore, the cost per arrest for liquor law violation would be the product of 52 percent, $6,500, and 20 percent, which equals $676 per arrest. Because of uncertainty in these estimates, we round to the nearest $100 and use an estimate of $700. The rounding changes the benefits from reduced liquor law violation arrests by less than $1 per participant.

TABLE F.7

VALUE OF STOLEN PROPERTY TO CRIMINALS

Crime	Average Property Loss Per Victimization (1995 Dollars)	Fence Rate[a] (Percentage)	Impact (Victimizations per 1,000 Participants)	Estimated Value to Criminals[b] (1995 Dollars Per Participant)
Robbery	$894	83%	-10.8	-$7.79
Burglary	1,282	25	-111.0	-34.57
Motor Vehicle Theft	5,171	20	-7.6	2.22
Larceny	512	33	13.5	-7.64
Shoplifting, Forgery, and Fraud	100	100	-5.0	-0.49
Total[c]	--	--	--	-$48.27

SOURCES: Average property loss from Maguire and Pastore (1998); Fence rates for motor vehicles from Wilson and Abrahamse (1992); All other fence rates from Johnson et al. (1985); Impacts from Table V.3.

[a] The fence rate is the fraction of the property value stolen from victims that represents a gain to criminals.

[b] Estimated value to criminals is the product of the average property loss, the fence rate, and the impact per participant, discounted to the present value based on the time pattern of impacts over the four-year observation period. It has a negative value because Job Corps reduced crime, and therefore reduced the gains to criminals.

[c] Totals may not equal the sum of the rows because of rounding.

APPENDIX G

ESTIMATION OF THE COST DIFFERENCES BETWEEN RESIDENTIAL AND NONRESIDENTIAL SLOTS

Our estimates of the cost of Job Corps are based on the average cost per participant in the research sample. We estimated a cost for each participant in our research sample based on the center attended, the length of time spent in Job Corps, and the residential status. This appendix describes our approach to estimating the cost of residential and nonresidential slots at Job Corps centers.

We estimated the relative cost of nonresidential and residential slots for three main reasons. First, we needed an estimate of the cost of a residential and a nonresidential slot to estimate average costs for all members of our research sample. Second, we are interested in the cost difference between residential and nonresidential students because it sheds light on whether the relatively high costs of Job Corps are a result of the residential component of the program. Third, estimating costs for residential and nonresidential students allowed us to address whether the program is cost-effective for both residential and nonresidential students.

While we do not know the costs of Job Corps by student, we do have estimates of the costs by center. Therefore, it was not necessary to estimate separate costs for residential and nonresidential slots for the 43 percent of centers that serve exclusively residential students and the 3 percent of centers that serve exclusively nonresidential students, because the differences are already reflected in those centers' costs.[1] However, it is not straightforward to estimate the additional costs incurred by residential students at the 54 percent of centers with both residential and nonresidential students. Because nonresidential students share classes with residential students at these centers and can receive nearly all the services available to residential students, no categories of reported costs can be attributed to only residential or nonresidential students. Moreover, as there are only three exclusively nonresidential centers, which differ considerably in size and location from other centers, it could be misleading to rely on these centers alone to represent the costs for all nonresidential students.

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[1] The exact number of centers that serve exclusively residential or exclusively nonresidential students varies by year.

A. APPROACH

Our approach to estimating costs per slot by residential status was to estimate the relationship between the proportion of each center's slots that are residential and the center's costs per slot-year. To do this, we exploited the variation between centers in the proportion of slots that are designated for residential students. Specifically, we estimated the model:

$$\log C_{it} = \alpha + \beta X_{it} + \gamma R_{it} + e_{it}$$

where C_{it} is the cost per slot-year at center i in program year t, X_{it} includes variables expected to affect the cost per slot-year, R_{it} is the fraction of the center's slots that are residential, α, β, and γ are parameters to be estimated, and e_{it} is a random-error term. The purpose of the analysis was to estimate γ, used to calculate the proportional increase in a center's program costs resulting from an increase in the proportion of the center's slots that are for residential students.

The dependent variable is the log of costs per *slot*-year rather than the log of costs per *participant*-year, because costs depend more on the capacity of the center than the number of students actually enrolled. This is because most expenses are related to staff, who are hired based on the number of slots rather than the actual number of students. To allow different types of costs to vary differently with the proportion of residential slots, we estimated nine separate versions of the model, using a different cost component as the dependent variable in each model.

We included in X_{it} explanatory variables that we expected to affect costs per slot, including the average proportion of slots that are filled, the number of slots at the center, whether the center is a Civilian Conservation Center (CCC), indicators for the program year, and indicators for the region in which the center is operated.

Because we know the costs of residential slots at exclusively residential centers and the costs of nonresidential slots at exclusively nonresidential centers, we need only estimate the costs of residential and nonresidential slots at centers with both residential and nonresidential slots. Hence, we estimated the models for the 57 to 58 centers on the U.S. mainland with both residential and nonresidential slots. For each center, we used data on the costs in each of three program years: PY 1994, PY 1995, and PY 1996.

Our estimates of the cost of residential slots are derived from $\hat{\gamma}$, an estimate of the parameter γ, and R_{it}, the fraction of slots that are residential at center i in program year t. We assume that the relative cost of a residential slot (C_{rit}) and a nonresidential slot (C_{nit}) is the same in each year and in each center and equal to λ, where $\lambda = \exp(\hat{\gamma})$.[2]

We estimated the dollar costs per residential and nonresidential slot using the identities that

$$C_{it} = R_{it} C_{rit} + (1 - R_{it}) C_{nit}$$

where C_{it} is the average cost per slot at the center i in program year t, and

$$C_{rit} / C_{nit} = \lambda .$$

The cost per residential slot is

$$C_{rit} = \lambda \ C_{it} / (1 + R_{it} (\lambda - 1))$$

and the cost per nonresidential slot is

$$C_{rit} = C_{it} / (1 + R_{it} (\lambda - 1)).$$

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[2] $C_{rit} = \exp(\alpha + \beta X + \gamma)$ and $C_{nit} = \exp(\alpha + \beta X)$ so $C_{rit} / C_{nit} = exp(\gamma)$.

B. FINDINGS ON RESIDENTIAL-NONRESIDENTIAL COST DIFFERENCES

Table G.1 presents our estimates of the residential-nonresidential differences in costs per slot by cost component. Each row presents the estimate from a separate regression in which costs per slot-year for that cost component are the dependent variable. The proportion of a center's slots that are residential has a statistically significant impact on only four cost components:

1. ***Counseling, Residential Advisors, and Other Instruction.*** Costs of counseling, residential advisors, and other instruction for residential slots are 42 percent higher than for nonresidential slots. Residential students have a much greater need for residential advisors, who supervise residential students while they are in the dormitories. (We were unable to estimate the relative costs of residential advisors separately because these costs are reported together with the costs of counseling and other instruction).
2. ***Food.*** This is the cost of the ingredients for meals at the centers. Costs for food for residential slots are 75 percent higher than for nonresidential slots. While nonresidential students can eat their meals at the centers, many choose not to do so.
3. ***Health Services.*** Costs for health services for residential slots are 29 percent higher than for nonresidential slots. While the same medical and dental services are offered to both residential and nonresidential students, nonresidential students may choose not to use the infirmary when they are sick and use their own doctor rather than doctors at the center.
4. ***Center Capital Expenses.*** These include purchases of furniture and equipment, vehicle rentals, and materials used during vocational skills training projects. Costs of these capital expenses are 65 percent higher for residential slots than for nonresidential slots. Although this estimate is large, because capital expenses are less than 4 percent of total center expenditures, this finding does not have a large impact on our estimate of the total costs per slot.

Costs per slot were lower at centers with higher proportions of residential students for three cost components (academic instruction, support services other than food and clothing, and center administration), but none of these effects were statistically significant.

TABLE G.1

RESIDENTIAL-NONRESIDENTIAL DIFFERENCE IN COSTS PER SLOT, BY COST COMPONENT

Cost Component	Difference in Costs Per Slot as Percentage of the Cost for a Nonresidential Slot
Academic Instruction	-7.1%
Vocational Training	8.9
Counseling, Residential Advisors, and Other Instruction	41.8***
Food	75.4***
Clothing	14.1
Other Support Services	-11.1
Health Services	29.0***
Center Administration	-8.1
Center Capital Expenses	54.8**

NOTES: These were estimated from models of the log of costs per slot. The models also include the number of slots at the center, the proportion of slots that are filled, whether the center was CCC or contract, indicators for program year, and indicators for the region in which the center is located. The models were estimated using PY 1994, PY 1995, and PY 1996 data from all centers operating on the U.S. mainland that had both residential and nonresidential slots.

*** Significantly different from zero at the .10 level, two-tailed test
** Significantly different from zero at the .05 level, two-tailed test
* Significantly different from zero at the .01 level, two-tailed test

C. OTHER DETERMINANTS OF PROGRAM COSTS

Although our goal was to estimate the effect of the proportion of slots that are residential on costs per slot-year, the coefficients on the other variables in the regression model are also of interest. Rather than presenting the estimates of the coefficients on each variable for all nine regressions, we present in Table G.2 estimates from a model of costs per slot-year, where the costs are aggregated over all nine categories. Three findings are of interest.[3]

1. ***Costs Rise with Increased Capacity Utilization.*** Not surprisingly, increasing the proportion of slots that are filled increases costs per slot. Increasing the fraction of slots that were filled by 10 percentage points increased costs per slot-year by just under 3 percent.
2. ***Larger Centers Have Lower Costs.*** Even after controlling for other center characteristics, costs per slot were 1 percent higher for each additional 100 slots at a center.
3. ***CCCs Have Higher Costs than Contract Centers.*** Holding all the other characteristics in the model constant, CCCs were 14 percent more costly per slot-year than centers operated by private contractors.

These relationships were also found using data from all centers, rather than just those that offer slots to both residential and nonresidential students.

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[3] The coefficient on the proportion of residential slots suggests that a residential slot costs 12 percent more than a nonresidential slot at a center. This is slightly higher than our estimate obtained using the coefficients from regressions of each disaggregated cost component.

TABLE G.2

ESTIMATES OF THE EFFECTS OF CENTER CHARACTERISTICS ON CENTER OPERATING COSTS PER SLOT

Characteristic	Effects on Log of Costs per Slot-Year
Fraction of Slots That Are Residential	0.122** (0.055)
Fraction of Slots That Are Filled	0.264** (0.114)
Number of Slots (000s)	-0.115*** (0.029)
Indicator That Center Is a CCC	0.144*** (0.036)
Indicator for PY 1995	0.000 (0.187)
Indicator for PY 1996	0.022 (0.020)
Number of Observations	172
Adjusted R-Squared	0.509

NOTE: The model is estimated using cost data from all centers operating on the U.S. mainland with both residential and nonresidential slots in PY 1994, PY 1995, or PY 1996. The model also includes indicators for each region in which the center is located. Standard errors are presented in parentheses.

*** Significantly different from zero at the .10 level, two-tailed test
** Significantly different from zero at the .05 level, two-tailed test
* Significantly different from zero at the .01 level, two-tailed test

APPENDIX H

ESTIMATION OF UNREPORTED CENTER OPERATING COSTS

Most of Job Corps' operating costs are cited in its financial reports. However, some costs of operation are not paid out of Job Corps' budget and hence are not included in these reports. These unreported costs fall into three categories: (1) operation of the national and regional offices, (2) donated goods and services, and (3) grants. Data on the costs of operating the national and regional offices were obtained from an independent auditor (R. Navarro and Associates, Inc. 1995). This appendix describes how we estimated the costs of donations and grants.

A. APPROACH

Our basic approach was to conduct a detailed study of the use of resources in a three-month period at a random sample of Job Corps centers.

1. Sampling Approach

Sampling for this study occurred in two stages: (1) the selection of 23 centers for study,[1] and (2) the selection of three *reference* months.

The sample frame for the selection of centers reflected the sample frame for the impact analysis. Of the 110 centers operating in PY 1995, 105 were located in the contiguous 48 states. We excluded two centers from the frame because major construction had been scheduled for the time of the site visit.

From this frame, we randomly selected 23 centers through systematic stratified sampling.[2] We randomly assigned each of the 23 centers to a quarter in 1996, each quarter assigned to a center with a probability of one-fourth. We planned to visit all the sampled centers in the assigned quarter within this one-year period.[3] We chose as reference months the three full months preceding the month we first contacted the center to discuss the study.[4] Choosing recent reference months maximized the ability of center staff to provide accurate information about grants and donations. The reference months fell between October 1995 and December 1996.

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[1] We also visited these 23 centers as part of the process analysis (Johnson et al. 1999).

[2] Systematic sampling consists of taking every *n*th sampling unit after a random start.

[3] Because of scheduling problems, the visits were actually completed in a 13-month period.

2. Measurement of Unreported Operating Costs at Each Center

Before visiting the centers, we sent them forms that asked about any grants, goods, or services received (in the three-month reference period only) but not listed on their financial reports (the ETA-2110 and ETA-2110F). The forms asked explicitly about: (1) financial grants, (2) goods given by the General Services Administration (GSA), (3) donated medical services and supplies, (4) donated food, and (5) any other goods or services contributed. When visiting the center, we met with its finance manager and administrative manager and discussed the forms the centers had completed. During these meetings, we ensured that all unbudgeted costs had been reported.

Centers were asked about grants or other funds they may have received. Because these grants would be used to purchase goods or services for Job Corps students, they represent a use of resources. Some students at the centers received educational grants to attend local colleges. Even though these grants were often sent directly to the college, we include them as grants "received" by the centers, because they offset college tuition costs that would have been paid by the center.

We asked the centers to estimate the market value of all the donated goods. For used goods, we asked for an estimate of the cost of purchasing an equivalent product in similar condition. Sometimes centers paid something for the donated goods, typically to cover transportation costs.

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[4] Because the first contacts with the centers were made at slightly different times within each quarter, the reference months differ slightly even between centers visited in the same quarter.

Because the amount the center paid is already captured in the reported center operating costs, we subtracted the amount the center paid from the estimated market value of the goods and services.

Centers purchase goods from the GSA but also receive some "surplus" goods free of charge. We were careful to ensure that we did not include in our measure of unreported costs any GSA goods that were *purchased,* because these costs would already have been included in the center operating costs. However, we valued the GSA surplus goods at the amount the center would pay to obtain the goods in similar condition from another source. One center sent some GSA surplus goods back to the GSA in the three-month reference period. We subtracted the value of these goods from unreported operating costs.

Centers received some services, such as medical services, free of charge. These were often donated by the state health departments and sometimes by private citizens or companies. We asked the centers to value these services at the cost of purchasing similar services from another provider. If, for example, the center received free vaccinations, we asked the center for the cost of obtaining these vaccinations privately.[5]

At some centers, volunteers perform a variety of functions. If they provided a service that could be purchased, such as counseling or clerical support, we valued their time at the cost of purchasing such a service. However, some volunteers provided services that were difficult to value. For example, some centers have programs in which members of the local community mentor Job Corps students. Because private markets do not exist for these services, we valued the volunteers' time at the minimum wage.

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[5] One center was unable to provide us with the cost of these vaccinations. For this center, we used the average cost of the same vaccinations received by the other centers in our sample.

3. Measuring Unreported Costs per Participant

We estimated the total unreported operating costs in Job Corps by summing over the value of such costs in each center for one quarter. We then multiplied by four to obtain an annual rather than a quarterly estimate of costs. We weighted each center so that the total unreported costs would reflect the total unreported costs in all centers in the contiguous 48 states.[6]

To estimate the cost *per participant-year,* we divided the total unreported costs by an average of the number of students in Job Corps centers in the sample frame in PY 1995 and PY 1996. For consistency with our estimates of reported operating costs, we adjusted for the unusually low capacity utilizations in PY 1995 (Chapter VI). We estimated the number of students that would have enrolled in Job Corps centers if the capacity utilization in PY 1995 had been 97.8 percent (the average of the capacity utilization in PY 1993 and PY 1996) rather than its actual capacity utilization of 88.6 percent. We estimated the cost *per participant* by multiplying the cost per participant-year by the average length of stay in Job Corps of a member of our research sample (0.62 years).

C. FINDINGS

We estimate that Job Corps centers used over $17 million of unbudgeted resources each year (Table H.1), about $288 per participant. Of this, donated goods and services accounted for about $246 (85 percent), and grants accounted for the other $42 (15 percent).

Nearly all centers (96 percent) received some sort of donated goods or services each quarter. More than half the centers received GSA goods, medical supplies or services from the government, or services contributed by private individuals or organizations. The types of goods and services received include:

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[6] Details of this weighting are provided in McConnell (1999), Appendix A.

TABLE H.1

CENTER OPERATING COSTS NOT REPORTED ON PROGRAM FINANCIAL REPORTS

Component	Percentage of Centers That Receive Items, Services, or Grants in a Quarter	Total Annual Value (000s 1995 Dollars)	Cost per Participant (1995 Dollars)
Donated Goods and Services			
GSA Goods	48%	$8,784	$146
Food from Agriculture Departments	31	184	3
Medical Supplies and Services			
Government	61	823	14
Private	28	346	6
Other Donated Goods			
Government	11	505	8
Private	17	991	16
Other Donated Services			
Government	11	1,129	19
Private	68	2,063	34
Grants			
Education	29	1,733	29
Other	18	812	13
Total	96%[a]	$17,370	$288

SOURCE: Study of resource use at 23 centers conducted in 1996 and 1997 as part of the National Job Corps Study

[a] Percentage of centers that incurred any unreported costs in a quarter.

- ***GSA Goods.*** The centers received a wide range of surplus goods from the GSA, including furniture, equipment, and clothing. We estimated that Job Corps receives GSA goods worth on average $146 per participant.

- ***Food from the Department of Agriculture.*** The centers received "surplus" food worth about $3 per participant from both the U.S. Department of Agriculture and state departments of agriculture. The centers frequently paid for the transportation of the food to the centers.

- ***Medical Supplies and Services.*** Centers received both donated medical supplies, such as vaccines and contraceptives, and donated services from medical professionals. Typically the supplies and services, valued at about $19 per participant, were obtained from state or county health departments, but some were obtained from private companies and nonprofit associations.

- ***Other Donated Goods.*** In addition to GSA surplus goods and medical supplies, Job Corps received a variety of other donated goods amounting to about $28 per participant. Examples include books from a local library and a smoking cessation video from a private company.

- ***Other Donated Services.*** Some centers had volunteers who helped out in many different ways, including tutoring, counseling, coaching, and providing clerical assistance. These volunteers included students, trained professionals, and members of local government, as well as unaffiliated private citizens. We estimate that these services together cost $53 per participant.

To help defray their costs, some centers also used grants to pay for goods and services that otherwise would be paid for out of program expenditures and thus would be a cost to society. Centers frequently helped students apply for education grants, such as the Federal Pell Grants, Federal Supplemental Educational Opportunity Grants, and state education grants. Some centers also received state government grants, AFDC grants to cover some of the costs of child care at the center, and private donations. We estimated that the centers received annually over $2.5 million in grants, or about $42 per participant.

APPENDIX I

BENEFITS AND COSTS FOR SELECTED SUBGROUPS

We found that benefits from Job Corps exceed its costs for the full sample. From a policy perspective, it is important to determine whether this is because Job Corps is broadly cost-effective over the population it serves or cost-effective for certain youths only and not for others. To address this question, we estimated benefits and costs for key subgroups. This appendix describes our approach to this subgroup analysis and presents our finding that Job Corps is cost-effective for most youth it serves.

A. APPROACH TO SUBGROUP ANALYSIS

We estimated benefits and costs separately for subgroups defined by three characteristics: residential status, the type of center attended, and the size of the center attended. Understanding the cost-effectiveness of Job Corps along these dimensions is important, because costs and program experiences can vary substantially across centers and within centers, depending on whether the students attend as residents or nonresidents. The two center types we examined were contract centers, which are operated by private contractors, and Civilian Conservation Centers (CCCs), which are operated by government agencies (the U.S. Departments of Agriculture or Interior). We also estimated benefits and costs by center size, grouping the centers into three categories of student capacity: small centers (225 slots or fewer), medium-sized centers (226 to 495 slots), and large centers (more than 495 slots).

In estimating benefits and costs, we allowed two sets of factors to vary between subgroups:

1. ***Impact Estimates.*** The benefits are based on impacts estimated from program-control group differences *within* each subgroup.

2. ***Program Costs.*** We estimated costs separately for each subgroup by averaging the cost over students in each subgroup. The estimate of the reported operating cost per student varies with the center attended, whether the youth attended as a residential or nonresidential student, and the length of time the student stayed at the center. We assumed that the estimate of the unreported program costs varied by subgroup in the same way as the reported program costs. For capital costs, we assumed that the cost of dormitories was incurred only by

residents while the other capital costs were incurred by all students, but otherwise the capital costs per slot did not vary by center.[1]

The other key assumptions, including the discount rate, the dollar values we place on the impacts, and the assumptions about how benefits persist after the observation period, did not vary by subgroup.[2]

Information on whether a youth attended as a residential or nonresidential student or attended a certain type of center is available only for program group members who enrolled in Job Corps. Estimating the impact of Job Corps for these subgroups would require knowing which control group members *would have* enrolled in each center type and what their residential status *would have been*. Therefore, we asked the Outreach and Admissions (OA) counselors, prior to random assignment, to predict the center and residential status to which each sample member would most likely be assigned if enrolled.

Because information on the likely residential status and center designation was collected before random assignment, it is available for both program and control group members. Thus, we estimated the impacts of these subgroups by comparing (1) the outcomes of program group members designated for a residential or nonresidential slot or predicted to attend a type of center, with (2) the outcomes of the control group members who were designated for the same type of slot or *predicted* to attend the same type of center. We averaged costs over program group members according to their designated subgroup rather than their actual subgroup. As the OA counselors were accurate in their predictions,[3] we believe this analysis produced reliable estimates of the benefits and costs by subgroup.

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[1] To estimate the percentage of capital costs that is incurred by residential students only, we used the percentage of the square footage that a typical center used for dormitories. A study of 15 centers (National Office of Job Corps 1993) found that 40 percent of the square footage of the centers' buildings was made up of dormitories, office space, or recreational facilities. We assumed that 75 percent of this, or 30 percent of the total capital costs, was accounted for by dormitories alone.

[2] We did adjust the length of the period in which we expect benefits to continue for each subgroup to account for how the age composition of the subgroup affects the number of years until retirement age or the likely time pattern of child care costs.

The subgroup impact estimates that underlie this benefit-cost analysis use individual participants as the unit of analysis. This addresses the question, What are the benefits and costs of Job Corps for the average student belonging to a given subgroup? This definition of the unit of analysis is consistent with the main benefit-cost analysis and the main impact analysis (Schochet et al. 2001). A separate report documenting the impacts by center characteristics (Burghardt and Schochet 2001) used Job Corps centers as the unit of analysis. That report addressed a slightly different question: For a typical center of a specific type, what is the average impact of Job Corps for students who are assigned to this type of center? The impacts reported in the center-based analysis differ from those in the student-based analysis because they placed equal weight on centers of different sizes. In the subgroup analysis reported here, if a center has more students, it contributes more data to the analysis.

B. SUBGROUP FINDINGS

The subgroup analysis addresses whether Job Corps is cost-effective for different types of students. Because applicants were not randomly assigned to a residential status or to different centers, the subgroup analysis does *not* support conclusions about how residential students would fare as nonresidents, how nonresidential students would fare as residents, or how students at one type of center would fare at another type of center. We focus instead on how well students in each type of center fare relative to a control group who would have enrolled in that same type of center, and how residents and nonresidents fare in comparison to those who would have enrolled with the same residential status.

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[3] About 98 percent of all enrollees designated for a residential slot enrolled in such a slot, and about 88 percent of enrollees designated for a nonresidential slot enrolled in one. About 93

The key determinant of net benefits is value of benefits after the observation period. These benefits, which average about $26,800 per participant overall, vary considerably by subgroup (Table I.1, second column). The lowest estimate is about $22,500 per participant (found for youth designated for medium-sized centers). The highest estimate is $35,500 per participant (for youth designated to attend CCCs). Nearly all of this variation is the result of small variations in the estimated impact on earnings in year 4 of the observation period, which are magnified by the procedure for extrapolating these benefits beyond the observation period. The difference in the year 4 impact on compensation between the subgroup in Table I.1 with the lowest impacts and the subgroup with the highest impacts, $700 per participant, translates into a difference in total benefits from increased output of about $12,000.

Variations in the value of all other benefits and in the program costs net of transfers are much smaller. The estimates of benefits during the observation period have a range of about $5,000 across different subgroups (Table I.1, first column). The estimated value of these benefits was higher for residential students than for nonresidential ones, higher for students in CCCs than for those in contract centers, and higher for students in small centers than for those in medium-sized or large centers.

The estimates of program costs to society have a range of less than $4,300 for these subgroups (Table I.1, third column). Estimated program costs were higher for residential than for nonresidential students, higher for students at CCCs than at contract centers, and higher for students at smaller centers than at medium-sized and large centers. The subgroups with the highest value of other benefits also have the highest program costs, so the variations across subgroups in the net benefits, the sum of these three components, is driven almost entirely by the impacts on earnings in year 4.

(continued)
percent of enrollees enrolled in the center the OA counselor had predicted.

TABLE I.1

BENEFITS AND COSTS TO SOCIETY BY SUBGROUP
(1995 Dollars)

	Value to Society Per Participant			
Subgroup	Benefits During the Observation Period	Benefits After the Observation Period	Program Costs	Net Benefits
All	$4,179	$26,778	-$14,128	$16,825
Resident Status				
Residential Designees	4,348	26,161	-14,705	15,804
Nonresidential Designees	2,956	30,740	-11,723	21,972
Operator Type of Designated Center				
CCC	7,783	35,463	-15,977	27,270
Contract	3,174	27,092	-13,600	16,667
Size of Designated Center				
Small	6,504	34,675	-15,112	26,068
Medium	2,770	22,541	-13,736	11,575
Large	3,769	32,142	-13,686	22,225

SOURCE: Benefits are based on impacts estimated from baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews. Costs were estimated from program expenditure data from the National Office of Job Corps.

Adding all the costs and benefits together for each subgroup, we find that the net benefits of Job Corps are positive for every one. Estimates of net benefits range from $11,600 to $27,300 per participant.

While we did not subject these estimates to the sensitivity tests used in the main benefit-cost analysis (Appendix B), the same caveats apply. The size of the net benefits is sensitive to changes in the size of the impact on earnings in the last year of the observation period. The range of uncertainty in our overall estimate of net benefits from the estimate of year 4 earnings impact, presented in Appendix B, was about $13,000 above or below the benchmark estimate of $17,000 per participant. Only the net benefits estimated for students attending medium-sized centers are close to that $13,000 threshold. The net benefit estimates for the other subgroups are considerably higher. Thus, we can be reasonably confident that benefits exceed costs for the subgroups discussed here.

While the analysis suggests that each of these groups produces positive net benefits, we cannot infer meaningful differences in the size of the net benefits of Job Corps across subgroups. The range of uncertainty about benefits beyond the observation period is much larger than the size of the differences in net benefits between subgroups. For example, if the impact on earnings in the last year of the observation period declined by 3 percent each year for students who attended small centers, remained constant for students who attended large centers, and increased by 3 percent each year for students who attended medium-sized centers, benefits would still exceed costs for each subgroup, but the rank ordering of the net benefit estimates for those subgroups would be reversed.

C. OTHER SUBGROUPS

We did not conduct a formal benefit-cost analysis for subgroups defined by youths' baseline characteristics, because under reasonable assumptions, we can infer the results using a simpler method.[4] However, the impacts on earnings in the last year of the observation period, estimated separately by subgroup, are important enough in the overall calculation of net benefits that we can use them to show whether the benefits of Job Corps will exceed its costs for a particular subgroup. This is because the benefits of increased earnings after the observation period, which are extrapolated from these year 4 earnings impacts, are the only benefits of Job Corps that are large relative to the program's costs.

The estimated benefits from increased earnings after the observation period for subgroups defined by age at application, gender, educational attainment at application, and race/ethnicity are presented in Table I.2. These benefits are high for almost all subgroups. Some of these subgroups are small, less than five percent of the sample, so the estimates are not very reliable. Among the larger subgroups, benefits are likely to exceed costs for all but two: Hispanics and youth ages 18 and 19 at application.[5] The impacts on earnings, use of other programs and services, and crime within the observation period for these subgroups (Schochet et al. 2001) are not large enough for total benefits to be close to the average program cost of about $14,000 per participant. We have no reason to expect that the program costs for these groups are so much lower than the average overall cost that the net benefits would be positive for these subgroups.

We can be fairly confident that the net benefits of Job Corps are positive for nearly every subgroup except those discussed above. The benefits after the observation period are high relative to average costs for all the other subgroups listed in Table I.2. Assuming for simplicity that all benefits during the observation period are zero for each subgroup, the

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[4] Estimating program costs for subgroups of youth whose characteristics vary within centers requires statistical modeling (see Appendix G) and hence is not straightforward.

[5] A third subgroup, female nonresidential designees without children, also did not show large earnings impacts in the last year of the observation period. This subgroup, however, was very small: less than 5 percent of the Job Corps sample. Unusually low earnings impacts for this group, as well as the unusually high earnings impacts for male nonresidential designees, are more likely the result of chance than of true program effects.

TABLE I.2

IMPACTS ON EARNINGS AND FRINGE BENEFITS BY SUBGROUP
(1995 Dollars)

Subgroup	Impact on Earnings and Fringe Benefits In Year 4	Estimated Benefits After the Observation Period[a]
Full Sample	$1,550	$27,273
Age at Application		
16-17 year olds	1,271	22,364
18-19 year olds	402	7,073
20-24 year olds	3,374	59,368
Gender		
Males	1,751	30,810
Females	1,321	23,244
Educational Attainment at Application		
Without High School Credential	2,249	39,573
With High School Credential	1,364	24,001
Gender by Designated Residential Status and Presence of Children		
Male Residential Designee	1,609	28,311
Female Residential DesigneeWithout Children	1,343	23,631
Female Residential Designee With Children	1,986	34,945
Male Nonresidential Designee	3,810	67,040
Female Nonresidential Designee Without Children[b]	-1,039	-18,282
Female Nonresidential Designee With Children	2,271	39,960
Race/Ethnicity		
White	3,023	53,192
Black	1,599	28,136
Hispanic	-712	-12,528
Other[b]	1,139	20,042

SOURCE: Impacts are estimated from baseline and 12-, 30-, and 48-month follow-up interview data for those who completed 48-month interviews.

[a] Estimated impacts after the observation period are equal to the impact on earnings and fringe benefits in year 4 multiplied by 17.596.

[b] Subgroup contains less than 5 percent of the sample.

estimated net benefits for all subgroups (except the three listed above) would still be positive as long as program costs do not exceed $20,000 per participant. It is unlikely that program costs for any of these subgroups exceed $20,000, which is over 40 percent higher than the overall average.

While we did not estimate program costs using variation within the centers, we did estimate average program costs for youths belonging to these subgroups based on the centers they attended, their length of stay in Job Corps, and whether they were residential or nonresidential. These estimates differed from the national average by less than 25 percent, and we have no reason to expect that the costs for these demographic groups vary greatly within centers for reasons other than length of stay or residential status. In addition, we did find beneficial impacts within the observation period, so benefits could exceed costs for these subgroups even if costs were higher than $20,000 per participant.

Overall, the formal analysis of benefits and costs for subgroups of youth defined by center type and residential status and the informal analysis of benefits and costs for subgroups of youth defined by demographic characteristics show that the large, positive net benefits of Job Corps do not come from a small set of subgroups. Rather, they are come from a broad range of subgroups, including different types of students with different types of program experiences.